

# Essays in Applied Microeconomics

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# Essays in Applied Microeconomics

Thesis

*for Liliana and Stefan*

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# Summary

The thesis consists of three independent papers. The summary of each paper follows:

At the end of 2001, the Indian Supreme Court issued a directive ordering states to institute school lunches – known locally as “midday meals” – in government primary schools. The first paper of this thesis provides a large-scale assessment of the enrollment effects of India’s midday meal scheme, which offers warm lunches, free of cost, to 120 million primary school children across India and is the largest school feeding program in the world. To isolate the causal effect of the policy, we make use of its staggered implementation across Indian states in government but not private schools. Using a panel data set of over 420,000 schools observed annually from 2002 to 2004, we find that midday meals result in substantial increases in primary school enrollment, driven by early primary school responses to the program. Our results are robust to a wide range of specification tests.

The second paper, unlike most of empirical literature on the topic, views entrepreneurship as a dynamic process with multiple stages. We study the correlation between the first two stages of entrepreneurship (trial and startup) and local religious diversity. We find that localities with higher religious diversity are associated with a higher individual probability to try to set up a new venture, but not with a higher individual probability to actually set it up. The positive association between local religious diversity and entrepreneurial trial is positively moderated by individual social capital when understood as access to weak ties and position to bridge structural holes, but not when understood as closure. Our results survive a variety of validity checks. We use a new survey data set, the Life in Transition Survey II 2010, that enables us to analyze entrepreneurship in the previously under-studied transition region. Our data covers over 30,000 households from 29 countries from Eastern Europe and Central Asia.

The third paper analyzes the role of information in a market where consumers feel altruism towards workers and derive a warm-glow from buying products of firms that pay their workers at least a minimum wage. Symmetric pure-strategy equilibria are analyzed in a random utility model with a continuum of consumers and  $n$  firms. When wages are observable by consumers, workers receive a socially-optimal wage level and firms obtain the highest possible profits. In the incomplete information case, workers receive minimum wages. A truth-telling monitor that probabilistically visits firms enables the existence of

the altruistic quality of the good. In the entire class of pure-strategy symmetric equilibria workers receive higher than minimum wages, while firms make positive mark-ups. A unique equilibrium with profits situated between those of incomplete and complete information is obtained when restricting the possible beliefs of consumers.



# Zusammenfassung

Die Thesis besteht aus drei unabhängigen Arbeiten. Es folgt die Zusammenfassung jeder Arbeit:

Ende 2001 erlässt der indische Supreme Court eine Direktive, die die Staaten anweist, Schulessen – lokal bekannt als „Midday Meals“ - in öffentlichen Grundschulen einzuführen. Die erste Arbeit dieser Thesis behandelt eine groß angelegte Untersuchung der Einschulungseffekte des indischen Midday Meal Scheme. Dieses bietet täglich warme Mittagessen kostenlos für 120 Millionen Grundschüler in ganz Indien und ist das größte Programm dieser Art der Welt. Um die kausalen Effekte der Strategie zu isolieren, benutzen wir die schrittweise Implementierung des Programms in Indiens Staaten in öffentlichen, aber nicht privaten Schulen. Unter Verwendung eines Paneldatensatzes mit über 420.000 jährlich beobachteten Schulen von 2002 bis 2004, finden wir heraus, dass die Midday Meals zu einem substanziellen Zuwachs der Einschulung an Grundschulen führen, die hauptsächlich auf die Einschulung in frühe Klassen zurückzuführen ist. Unsere Ergebnisse sind robust gegenüber einer Vielzahl von Spezifikationstests.

Die zweite Arbeit, im Gegensatz zum Großteil der empirischen Literatur zu diesem Thema, betrachtet Entrepreneurship als dynamischen Prozess mit mehreren Stufen. Wir untersuchen die Korrelation zwischen den ersten zwei Stufen des Entrepreneurship (Versuch und Startup) und lokaler religiöser Diversität. Wir finden heraus, dass die Orte mit höherer religiöser Diversität mit einer höheren individuellen Wahrscheinlichkeit assoziiert sind, ein neues Unternehmen zu versuchen zu gründen, aber nicht mit einer höheren Wahrscheinlichkeit es tatsächlich zum Erfolg zu führen. Die positive Verbindung zwischen lokaler religiöser Diversität und unternehmerischen Versuchs ist positiv moderiert von individuellem Sozialkapital, wenn das als Zugriff auf schwache Bindungen verstanden wird und als Position zum Überbrücken von strukturellen Löchern in sozialen Netzwerken, aber nicht wenn es in einem geschlossenen sozialen Netzwerk stattfindet. Unsere Ergebnisse überstehen eine Vielzahl von Gültigkeitsprüfungen. Wir benutzen einen neuen Umfragedatensatz, den Life in Transition Survey II 2010, der es uns ermöglicht, Entrepreneurship in einer vorher wenig studierten Transition Region zu analysieren. Unsere Daten umfassen über 30.000 Haushalte aus 29 Ländern in Osteuropa und Zentralasien.

Die dritte Arbeit analysiert die Rolle von Informationen in einem Markt in dem Konsumenten gegenüber den Arbeitern Altruismus empfinden und ein wohliges Gefühl davon

ableiten, Produkte von Firmen zu kaufen, die ihren Arbeitern zumindest einen Mindestlohn bezahlen. Symmetrische reine Strategie Equilibria werden analysiert in einem Zufalls-Nutzenmodell mit einem Kontinuum an Konsumenten und  $n$  Firmen. Wenn Löhne von Konsumenten beobachtbar sind, dann erhalten Arbeiter einen sozial-optimalen Lohn und Firmen erwirtschaften den höchstmöglichen Gewinn. Im Fall der unvollständigen Informationen erhalten Arbeiter Mindestlöhne. Ein ehrlicher Überwacher, der zufällig Firmen besucht, ermöglicht die Existenz der altruistischen Qualität der Ware. In der gesamten Klasse von reinen symmetrischen Strategie Equilibria, erhalten Arbeiter mehr als die Mindestlöhne, während Firmen mehr positive Handelsspannen erreichen. Ein einzigartiges Equilibrium mit Gewinnen zwischen den Fällen der unvollständigen und vollständigen Informationen wird erreicht, wenn die möglichen Erwartungen der Konsumenten eingeschränkt werden.

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# 1 Introduction

This thesis is a collection of three independent research papers from the field of Applied Microeconomics. Each chapter addresses a different key question, every time posed from a different angle, but always related to economic development. First, from a pure Development Economics perspective, I analyze the causal effect of a nutrition policy in India on primary school enrollment. Second, at the intersection of Management and Labour Economics, I define and describe what entrepreneurship means in the context of Eastern Europe and the Former Soviet Union. Third, using methods from Industrial Organizations and an approach from Behavioral Economics, I model the goods' market that arises when consumers (usually located in the Western world) care what wages workers (usually located in developing countries) receive when producing the goods that consumers buy.

The first chapter answers important questions for evidenced-based education policy making. It is the result of joint work with Raji Jayaraman.<sup>1</sup> We illuminate if and how exactly the world's largest school feeding program functions. India's midday meal scheme served in 2006 lunch to over 120 million public primary school children every day of the year. Given the sheer scale of the program, it is crucial to understand its effects. School feeding programs have the potential to influence educational outcomes through at least three levers: by lowering the cost of education, by providing timely nutrition and by increasing the joy of coming to school. Moreover, at the time of the intervention, India was home to the largest number of out-of-school children. The need to rigourously evaluate this program, therefore, cannot be understated.

We provide the first large-scale evaluation of the midday meal scheme. Our sample contains over 420,000 public and private primary schools from 13 Indian states observed over three academic years from 2002 to 2005. We make use of a quasi-natural experiment that resulted from an Indian Supreme Court directive aimed at reducing starvation after massive floods.

Identification of a causal effect comes from two sources of variation: staggered state-level implementation of the directive and the fact that private schools did not offer midday meals. We find that the program lead to a large and statistically significant increase in primary school enrollment coming mainly from an increase in grade 1 enrollment. Back

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<sup>1</sup>The first chapter included in this thesis is a version with minor revisions of the paper written with Raji Jayaraman "The Impact of School Lunches on Primary School Enrollment: Evidence from India's Midday Meal Scheme", which is forthcoming in the *Scandinavian Journal of Economics*.

of the envelope calculations indicate that due to the midday meal scheme India's net primary school enrollment rate increased by at least 3 percentage points.

The second chapter contributes to the new ripening discussion about entrepreneurship. It is joint work with Elena Nikolova.<sup>2</sup> Despite the huge level of interest devoted to entrepreneurs in the economy, the bulk of economic literature simply assumes away the process of transforming information and knowledge into new firms and new products. Current academic knowledge about entrepreneurship is fragmentary at best. There isn't even an agreed upon definition of entrepreneurship. Moreover, for the non-Western world the picture is even less clear, given that most existing studies focus on US entrepreneurs.

The work in this chapter constitutes a step towards filling these knowledge gaps. First, we are able to operationalize the dynamic view of entrepreneurship as a multi-stage process. A lot of empirical studies, mostly due to data limitations, study entrepreneurship from the moment that a new venture is founded, thus failing to unveil the roots of entrepreneurship. In contrast, we not only study individuals who found new ventures (startup stage), but also those who try to (trial stage). Second, we document non-Western entrepreneurs from 29 Eastern European and Former Soviet Union countries.

Third, we describe the association between entrepreneurs and their environment as encouraged by the individual - opportunity nexus view of entrepreneurship (Shane and Venkataraman 2000). In particular we look at local religious diversity and, thus, also contribute to the discussion about the two-bladed nature of diversity. We find that local religious diversity is positively correlated with entrepreneurial trial, but not with entrepreneurial startup. We argue that the direction of the correlation can be interpreted as going from diversity to entrepreneurship and find indications of social capital, seen as bridging structural holes, being a moderator. We further put our results through several robustness tests.

The third chapter assesses the market feasibility of a recent consumer movement.<sup>3</sup> Since the advent of globalization and the shift of production facilities to developing countries, consumers have been faced with a new conundrum in their purchasing decisions. Working conditions in developing countries are much worse than in consumers' home countries. In fact, China, where most goods are currently produced, is ranked by the International Trade Union Confederation in the top 5 worst countries worldwide for workers.<sup>4</sup> Given this context, not only have anti-sweatshop movements sprawled, but also average consumers have started taking working conditions into account when making a purchase - as the success of fair trade products shows.

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<sup>2</sup>The second chapter included in this thesis is a heavily revised version of the paper written with Elena Nikolova "Does cultural diversity help or hinder entrepreneurs? Evidence from eastern Europe and central Asia", EBRD Working Paper No. 158 from June 2013.

<sup>3</sup>The third chapter of this thesis is a heavily revised and extended version of my Master Thesis "The Role of Information in the Market for Altruism", June 2012.

<sup>4</sup>Wolfe S. "These 6 countries are among the worst in the world for workers". [http :  
//www.globalpost.com/dispatch/news/business/140529/these – 6 – countries – are – among – the –  
worst – workers](http://www.globalpost.com/dispatch/news/business/140529/these-6-countries-are-among-the-worst-workers). Retrieved August 1, 2015.

The work in this chapter is among the first to consider altruism in a market setting between consumers and workers. In my model consumers care not only about a firm's price, but also about its working conditions. Interestingly, both consumers and firms are better off when fair wages and not minimal wages are provided. Yet in reality, fair wages fail to always be offered. I show that the difficulty of bringing to market a product that caters to the altruistic nature of consumers is of an informational nature. Firms cannot credibly communicate to consumers the wages that they pay. I propose as a solution the introduction of an independent third party to randomly monitor firms and announce the observed wages. I show that in such a situation workers will always receive higher than minimal wages and when consumers exhibit a certain level of trust firms can always make higher profits than when offering minimal wages.

## 2 The Impact of School Lunches on Primary School Enrollment: Evidence from India's Midday Meal Scheme



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### 3 Religious Diversity: Helping or Hindering Entrepreneurs in Transition Countries?

### 3.1 Introduction

With the fall of the Iron Curtain, the process of transition from communism to a market economy started for the countries of Central and Eastern Europe (CEE) and of the former Soviet Union (FSU).<sup>1</sup> Since then, entrepreneurship is not only once again a legal pursuit, but tightly linked to the success of transition economies (Bruton, Ahlstrom, and Obloj (2008); McMullen (2011)).<sup>2</sup> Entrepreneurial activity is an important ingredient of growth, particularly in the early years of transition, since small business owners established businesses in industries that did not exist, or were stagnant, under socialism (Berkowitz and DeJong 2011). Likewise, sales and employment grow faster in entrepreneurial ventures than in state or privatized firms, and new businesses are more efficient (McMillan and Woodruff 2002). Entrepreneurial ventures may also be an effective way of mitigating income shocks by providing households with an alternative source of employment. In this way, entrepreneurship may also drive innovation that benefits the disenfranchised, also known as inclusive innovation (George, McGahan, and Prabhu 2012).

Yet the determinants of entrepreneurship are in general insufficiently understood (Shane 2003). On the one hand, this is due to the lack of comparable data on business attempts and start-ups across all transition countries. On the other hand, an additional challenge lies in appropriately defining an entrepreneur in this context. It cannot be simply assumed that the characteristics of entrepreneurs are the same as in the more studied Western countries (Smallbone and Welter 2006). In the transition region, the most common type of business owner is not the well studied Schumpeterian type prevalent in the West, but rather the Kirznerian type that is less innovative and more dependent on his environment for the generation of opportunities (Estrin, Meyer, and Bytchkova 2006). It is therefore especially important in transition countries to study the link between entrepreneurs and their communities.

In this paper, we bridge both of these gaps by studying the link between local religious diversity (measured as religious fractionalization in each respondent’s primary sampling unit) and individual entrepreneurial behavior, using a new data set: the 2010 Life in Transition Survey (LiTS). This rich data set, which covers 29 transition countries, allows us to operationalize a dynamic view of entrepreneurship as a multi-stage process. We focus on the first two stages. (i) The *Trial Stage* takes place pre-startup and comprises the initial attempts towards building a new venture, such as for example discovering a business opportunity, creating a team, accessing finance. We define the individuals who are in this stage as potential entrepreneurs. (ii) The *Startup Stage* is reached with the founding of the new business. We define nascent entrepreneurs as those individuals who have managed to start a company up. In particular, our data captures small businesses

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<sup>1</sup>Referred to in the rest of the paper as the “transition region”

<sup>2</sup>Creating a new private business was illegal in the former Soviet Union since 1917 and in Eastern Europe since 1945. (Estrin, Meyer, and Bytchkova 2006)

(with at most 1-2 employees) that may operate in either the formal or the informal sector.<sup>3</sup> Following Harrison and Klein (2007), we define diversity to mean variety diversity, and use all references to diversity or any of its synonyms to imply the same. More precisely, we proxy variety by the distribution of religious attributes of survey respondents within a locality.

We find that localities with more religious diversity are positively associated with higher numbers of potential entrepreneurs, but not associated with higher numbers of nascent entrepreneurs. Our results are in line with previous research that finds that diversity is a double-edged sword. On the one hand, diversity can breed creativity and give access to new information, but on the other hand, diversity can lead to poor outcomes and conflict (Lazear (1999); Fearon and Laitin (1996) and other studies reviewed in Section 3.2). Our results suggest that diversity is beneficial especially in the phase where information and creativity is highly relevant. Namely, in the trial phase where business opportunities are first discovered. For a successful exploitation of a business opportunity, however, a successful completion of certain processes is necessary, such as for example access to finance, building a team and creating a business plan (Aldrich (1999); Aldrich and Martinez (2001)). In the start-up phase, conflict can therefore be detrimental.

We further investigate the moderating role of social capital. The lack of formal institutional frameworks implies that especially in a transition context, social networks gain a pivotal role for success (Lyles, Saxton, and Watson (2004); Batjargal (2003)).<sup>4</sup> Theoretically, the social capital of a group increases with the network density *inside* the group and with bridge relationships over structural holes *outside* the group (Coleman and Coleman (1994); Burt (1992) and other papers presented in Section 3.2). We find that social capital positively moderates the association between local diversity and entrepreneurial trial when it is understood as bridging structural holes and access to weak ties, but not when it is understood as closure. This is in line with previous research that finds that the benefits of diversity fail to materialize when the different groups are disconnected communities with little interaction (Bacharach, Bamberger, and Vashdi 2005).

We focus on religious diversity for both substantive and empirical reasons. First, religious identity is arguably less imprecise as compared to ethnicity or language: even if a person can be multi-lingual or multi-ethnic, one can rarely be a member of multiple religious groups. As a result, endogenous reporting of religious affiliation may be less likely, as compared to ethnicity or language. Moreover, even though communist governments suppressed religious practise, religious cleavages have been important in the region both historically (during the times of the Ottoman empire) as well as more recently (during the civil wars in former Yugoslavia, Kosovo and Tajikistan, among others). Even so, we

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<sup>3</sup>Accounting for businesses in the informal sector is important, since in transition countries an important percentage of economic activity takes place in the underground economy.

<sup>4</sup>McMillan and Woodruff (2002) describe how successful entrepreneurs in transition regions helped themselves by creating substitutes for missing institutions, for example: reputation instead of court-enforced contracts, loans between firms instead of bank credits.

replicate our analysis with a linguistic diversity measure and obtain similar results.<sup>5</sup>

We contribute to existing research along at least three dimensions. First, while most of the literature has focused on cross-country regressions or firms, we calculate a new sub-national measure of religious diversity using comparable data for all transition countries. Second, unlike most of previous work, the richness of our data allows us to explore both why an individual attempted to start a business, and why he was successful. Unpacking the contributions of both processes is highly policy-relevant, as many individuals who embark on the process of starting a business never reach the point of actually founding it. We advance the debate on the benefits versus costs of diversity by showing that religious diversity is correlated with more potential entrepreneurs, but not with more nascent entrepreneurs. Third, our analysis sheds light on entrepreneurship in the transition region, a part of the world that has been understudied in both the diversity and entrepreneurial literatures.

The approach and results of this paper are subject to two main caveats. First, LiTS is neither an entrepreneurial survey nor a country census, so one may question the reliability of our measures of diversity and entrepreneurship. This is less likely to be a serious concern, as the country-level correlations between our survey variables and those from the Global Entrepreneurship Monitor (on the comparable questions on entrepreneurial trial) and the Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg (2003) data on religious and linguistic fractionalization are high and range between 0.6 and 0.85. Second, while LiTS is representative at the country level, this is not the case for sub-national levels of aggregation. Unfortunately, no other sub-national measures of religious diversity for the entire transition region are available. However, analysis at the primary sampling unit (PSU) level using the LiTS data has also been undertaken in other published work, such as Grosjean and Senik (2011) and Grosjean (2011). We also replicate our results using diversity calculated at the level of sub-national administrative regions and using a dummy measure of local diversity and obtain similar results.

This paper proceeds as follows. Section 3.2 reviews the relevant literature and builds the hypotheses. Section 3.3 discusses the data set and the empirical approach. Section 3.4 presents the results, followed by several robustness checks in Section 3.5. Finally, Section 3.6 concludes.

## 3.2 Related Literature and Hypotheses

**Entrepreneurship.** Due to the unique context of the transition region, Estrin, Meyer, and Bytchkova (2006) call for the need to adapt the Western definition of entrepreneurship so as to include a wider range of entrepreneurial activity. Nevertheless, defining and explaining entrepreneurship is no easy task. The bulk of economic literature assumes

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<sup>5</sup>Results available upon request. For ethnicity we, unfortunately, cannot do the same, as it is missing for a large number of observations.

away the process of how new information and knowledge is transformed into new firms and new products. Moreover, Shane (2003) states that there is “no coherent conceptual framework for entrepreneurship” and the knowledge on the topic is “fragmentary”. A large part of the management literature focuses exclusively either on the characteristics of the individual entrepreneur or on the environment, but rarely on the entrepreneurship process as a whole (Shane 2003).

A unifying framework of various facts about entrepreneurship is that of the individual-opportunity nexus, which requires the existence of two phenomena: potentially lucrative opportunities and enterprising individuals (Eckhardt and Shane (2003); Shane and Venkataraman (2000); Venkataraman (1997)). According to Shane and Venkataraman (2000), focusing only on individuals who establish new organizations is problematic, because a successful outcome is not a necessary condition of entrepreneurship. The individual-opportunity nexus defines entrepreneurship as the activity of discovery, evaluation and exploitation of opportunities with the purpose of introducing new goods or new ways of organization (Shane 2003).

Moreover, entrepreneurship is a dynamic process. Studies that focus on established businesses can be misleading. Factors that explain one part, do not necessarily explain other parts of the process (Shane 2003). Eckhardt and Ciuchta (2008) construct a model of entrepreneurship as a multi-stage selection process. Entrepreneurs draw from an initial pool of opportunities with varying characteristics, following which further selection, either internal (by the entrepreneur) or external (by other market participants), takes place. At each stage potentially different factors matter.

Given the recent theoretical developments of the entrepreneurship literature, we expect to find that:

**H1:** The first two stages of entrepreneurship, Trial and Startup, are affected differently by individual and environmental factors.

Empirical studies that differentially examine the stages of entrepreneurship have been slow to follow, mainly due to the difficulty of obtaining data on new ventures in their pre-operational stage (Reynolds 2007). Two main datasets created for this purpose are The Panel Study of Entrepreneurial Dynamics (PSED), for the US, and the Global Entrepreneurship Monitor (GEM), for 85 countries. Davidsson and Gordon (2012), in their comprehensive review of PSED-related papers, find a mismatch between entrepreneurial theories created with innovative, high growth ventures in mind and the empirical reality of the “modest majority” (Samuelsson and Davidsson 2009). In fact, most entrepreneurs invest little money in their start-ups and aim to create something small and manageable (Human and Matthews (2004); Kim, Aldrich, and Keister (2006)).

These empirical findings illustrate the need of updating current views of entrepreneurship. The spotlight in the literature has been on the glorious Schumpeterian entrepreneur (Shane 2003). According to Schumpeter (1934), entrepreneurial opportunities arise due

to new information, are very innovative, rare and create disequilibria. For society, Schumpeterian entrepreneurship is extremely valuable due to its “creative destruction”. Kirzner (1973), on the other hand, argued that opportunities do not arise from new information, but from differential access to existing information. A Kirznerian opportunity is more common, less innovative and reinforces established business practices (Shane 2003). As can be seen these two conflicting views of entrepreneurship lead to very different expectations of its determinants. Given how common the Kirznerian entrepreneur is, it is crucial to better understand him and his tight link to his environment.

The transition region is a perfect place to study the Kirznerian entrepreneur. Estrin, Meyer, and Bytchkova (2006) divide the transition process into three stages and explain the different types of entrepreneurs associated with each stage. In the first stage with extreme uncertainty, no market structure and only informal networks, there is place only for Kirznerian entrepreneurs. In the second stage, the price mechanism starts to slowly function as a conveyor of information. But it is only in the third stage, that more developed market institutions and property rights create the necessary environment for the existence of Schumpeterian entrepreneurs. Progression from stage to stage is not automatic and the initial Kirznerian entrepreneurship can become entrenched.

**Diversity.** Despite the great interest in the topic, diversity’s relationship to various outcomes is poorly understood. Theoretical arguments about its impact go either way. On the one hand, diversity could lead to better decision-making and positive outcomes (Van Knippenberg and Schippers 2007). The information perspective maintains that diverse groups are likely to have access to non-overlapping information sets and various skills relevant to the task at hand (Lazear 1999). Moreover, exposure to different views can lead to creativity and innovation (Hong and Page 2001). On the other hand, diversity could lead to conflicts and poor outcomes. According to the social characterization view people categorize themselves and others based on similarities and differences, which leads to the distinction between insiders and outsiders (Williams and O’Reilly 1998). In-group members are more trusted, which implies that homogeneous groups have fewer conflicts, are more committed and can better impose sanctions and enforce contracts (Fearon and Laitin (1996); Riordan and Shore (1997); Pelled, Eisenhardt, and Xin (1999); Karlan (2007)).

Diversity can be understood and conceptualized in various ways. What is important is the alignment of notions used for theory and measurement. Harrison and Klein (2007) classify diversity as being either of the separation, variety or disparity type.<sup>6</sup> Furthermore,

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<sup>6</sup>Diversity as separation can be understood as a difference in position or opinion and can be measured as dispersion or variance. Diversity as variety refers to differences in category and can be measured with Blau’s Index (explained in Section 3.3). Diversity as disparity means differences in access to socially valuable resources (such as status) and can be measured with a Gini coefficient.

in a firm diversity can be task-related (for example education or tenure) or non-task-related (for example demographic characteristics). The most similar type of diversity to the one in our paper is demographic (especially ethnic) variety diversity, and therefore mostly this literature shall be briefly reviewed.

The empirical findings at the firm level are inconclusive. Most research on the topic, as is this paper too, is based only on correlations and no causal claims can be made (Joshi, Liao, and Roh 2011). At the team-level, Joshi and Roh (2009) report in their literature review that more than half of the studies do not find a relationship between team outcomes and team diversity. The rest of the studies either find positive effects (for example Van Der Vegt, Van de Vliert, and Huang (2005)) or negative effects (for example Leonard, Levine, and Joshi (2004) ). Top-management teams have been examined mostly from the perspective of task-related diversity, but less from that of racial diversity (Certo, Lester, Dalton, and Dalton 2006). Roberson and Park (2007), in one of the few studies on the topic, find a U-shaped relationship between racial diversity of top-management teams and firm performance. Studies investigating the effects of firm-level diversity on firm outcomes are scarce and results so far are mixed (Joshi, Liao, and Roh 2011). Some studies find positive associations of firm-level racial diversity (Richard 2000), while others negative associations (Sacco and Schmitt 2005), and yet others a U-shaped relationship with firm outcomes (Richard, Barnett, Dwyer, and Chadwick 2004).

At the country and community level, several negative effects of diversity have been documented. Easterly and Levine (1997) show that in Africa ethno-linguistic fragmentation is correlated with lower levels of economic growth. A large literature that looks at US communities finds that an ethnically diverse population is associated with less efficient provision of public goods, less trust and less economic growth (see for example Alesina, Baqir, and Easterly (1999); Luttmer (2001); Alesina and La Ferrara (2002); Ottaviano and Peri (2005); Alesina and La Ferrara (2005)).

What effect community diversity has on entrepreneurship is less clear. As Alesina and La Ferrara (2005) point out, the resulting inefficient public goods can be replaced by more private goods, which implies that there is more opportunity for entrepreneurs. Moreover, religious diversity does not seem to have the same negative impact as the more studied ethnic diversity (Alesina, Devleeschauwer, Easterly, Kurlat, and Wacziarg 2003).

In conclusion, diversity is rife with potential for conflict, but if well harnessed can lead to positive outcomes. The negative effects of social categorization will come into play especially if the category to which someone belongs is salient (Lindzey, Gilbert, and Fiske 2003). Some religious differences are not easily detected (such as Christian Orthodox vs. Christian Catholic), but others, especially when correlated with ethnicity or salient rites, can be. We expect, nevertheless, the positive effects of the information perspective to dominate. We believe that entrepreneurs can benefit from the non-redundant, rich information found in diverse communities and will not be heavily stigmatized in their relationship with externals due to their religion. Moreover, inefficiencies in diverse



communities due to a difficulty of reaching a common understanding can be a source of entrepreneurial opportunity. Our second hypothesis, therefore, is:

**H2:** Religious diversity is positively associated with entrepreneurship (either Trial, Startup or both).

**Social Capital.** For understanding the link between diversity and entrepreneurship, we take a closer look at social capital as a potential moderator. Burt (1992) claims that the main determinant of entrepreneurship is access to information through social networks. As information is sticky, contact to the person holding it is important (Von Hippel 1994). Additionally to information, prior knowledge is needed as a complementary resource (Shane and Venkataraman (2000); Venkataraman (1997)). Knowledge, however, can be tacit and hard to verbalize, but can nevertheless be disseminated through social interaction (Polanyi (1967)).

Having social capital means being able to derive benefits from being well connected (Bourdieu and Wacquant (1992), Burt (1992); Putnam, Leonardi, and Nanetti (1993); Coleman and Coleman (1994)). When market information is ambiguous and not a clear guide to behavior networks can replace information. Benefits arise to those that have a certain status in the network or to those that imitate practices with signalling value (Bourdieu and Wacquant (1992); Podolny (1993); Bothner, Kim, and Smith (2012)). Yet Burt (2000) argues that true social capital comes not from network prominence or contagion, but from the structure of the network. In this sense, networks do not replace information, but affect its flow.

Social capital can follow from different types of structures. Coleman and Coleman (1994) argue for the benefits of closed, dense networks, where everybody is connected to everybody. In such a network, frequent contact leads to exchange of information, but more importantly trust is bred as collective sanctions can be easily imposed and reputation can arise (Tullock (1985)). Therefore, closure decreases the risk of cooperation.

Burt (1992), however, argues that structural holes in a network increase the benefits of cooperations. The one who bridges the holes obtains a competitive advantage. Within each group flows different information. The broker between two groups gets early access to new information and achieves entrepreneurial control over the flow of information (Burt 2000). This is in line with the argument of Granovetter (1973) about the strength of weak ties. Strong ties are likely to have similar information and thus their communication is redundant. New information usually comes from weak ties. Brokerage across structural holes has been associated with quick employment, successful teams, fast promotion, high compensation, positive work evaluations and innovation (for example: Granovetter (1995); Burt (2000); Burt, Hogarth, and Michaud (2000); Hansen, Mors, and Løvås (2005); Ahuja (2000) ).

In conclusion, the social capital of a group increases with the network density inside the group and with bridge relationships over structural holes outside the group. We expect

that a community that is religiously diverse can benefit from both these advantages. Religious groups are densely connected within. Religion’s function, according to evolutionary theorists, is to offer selective advantage at the group level by promoting cooperative behavior within the group (Norenzayan and Shariff (2008); Wilson (2010)). Adhering to a religion often requires members to alter their behavior, by following a particular diet, dress code or ritual. Such a “participation price” screens out individuals that may be only marginally committed to the group and creates tight religious communities (Iannaccone 1992). Moreover, each additional religious group creates additional structural holes in the community that offer potential for bridging to entrepreneurial individuals.<sup>7</sup> Therefore religious diversity could harness both the benefits of closure around a particular religion and the bridging advantages between different groups. We thus expect a positive interaction between religious diversity and individual social capital.

**H3:** Religious diversity in a community is particularly beneficial to entrepreneurs with social capital.

### 3.3 Data and Method

#### Data Description

Our main data source is the Life in Transition Survey II (LiTS) conducted by the European Bank for Reconstruction and Development and the World Bank in late 2010. The survey covers 29 post-transition countries from *Central Europe and the Baltic states*: Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic, Slovenia; *South-Eastern Europe*: Albania, Bosnia and Herzegovina, Bulgaria, FYR Macedonia, Kosovo, Montenegro, Romania, Serbia; *Eastern Europe and the Caucasus*: Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, Russia, Ukraine; *Central Asia*: Kazakhstan, Kyrgyz Republic, Mongolia, Tajikistan, Uzbekistan.<sup>8</sup> Each country has between 999 and 1,616 observations, with around 1,000 observations for most countries and about 1,500 observations for the larger countries such as for example Russia and Ukraine.

LiTS is a nationally representative survey. Respondents were drawn randomly, using a two-stage sampling method with primary and secondary sampling units. The Primary Sampling Units (PSU) are electoral districts, polling station territories, census enumer-

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<sup>7</sup> Religious groups provide structural holes that are active for a long time. A hole becomes inactive and closed when its bridges become part of the social structure. Burt (1992) explains that resistance to the closure of a hole occurs especially when the two groups have conflicting beliefs, such as is the case with religious groups.

<sup>8</sup>The survey includes for comparison purposes also 5 Western European countries (France, Germany, Italy, Sweden, United Kingdom) and Turkey. We exclude these countries from our sample because they did not undergo a period under Communism and therefore do not belong to the so-called “transition region”, which is the purpose of our study.

ation districts or geo-administrative divisions. We define in our estimates a locality as being a PSU. Each country has a minimum of 50 PSUs with each PSU containing around 20 observations. The Secondary Sampling Units are households. The head of the household or another knowledgeable household member answered the Household Roaster and questions about housing and expenses. All other modules were answered by a randomly drawn adult (over 18 years of age) from the household with no substitutions possible.<sup>9</sup> The survey company, IPSOS-MORI, provided us with additional data on PSU population size. We supplemented the survey data with external data on PSU geographic characteristics and access to natural resources.<sup>10</sup>

Table 3.1 presents means of all variables used in the main estimations. Columns 1 and 2 include the entire sample of respondents. On average just 14% try to start a new venture. More than half the sample is female and around the age of 44.<sup>11</sup> About 30% are Muslim, while 60% are Christian (either Catholic, Orthodox or Protestant). On a scale from 1 to 10, the average respondent places her general willingness to take risks at the midpoint.<sup>12</sup> The vast majority of respondents have finished their secondary education, but only 20% have a university degree. A respondent's father has on average 9 years of education. In 20% of the cases, somebody in the respondent's family or the respondent herself was part of the Communist party. Most respondents live in an urban setting. On a ten step ladder with the bottom containing the poorest 10% in the country and the top containing the richest 10%, households in a locality are on average on the 4th step. On a scale from 1 to 5, in a locality average trust in people in general is a bit over the midpoint. On a scale of 1 to 5, the average respondent in a locality believes that people like himself have to seldom make unofficial payments of gifts when requesting official documents or when going to courts for a civil matter.<sup>13</sup> On average a locality has a population of over 84,000, an elevation of about 380 meters, is located about 65 kilometers away from the nearest mine, 134 kilometers from the capital of the country and about 35 kilometers from the border. Just 40% of localities have access to a waterway. On average, localities are not very diverse with a religious fractionalization score of 0.19. Columns 3 and 4 include just the sub-sample of respondents that tried to start a new venture. Interestingly, there are almost no differences between Column 1 and 3. Of those that tried to start a business, about 30% applied for a loan and the vast majority got that loan approved.

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<sup>9</sup>The other modules are: Attitudes and Values; Climate Change; Labour, Education and Entrepreneurial Activity; Governance Miscellaneous Questions.

<sup>10</sup>Geographic data was retrieved in October 2012 from: *www.gpsvisualizer.com*; *www.daftlogic.com*; *www.diva-gis.org*; *maps.google.com*; *www.batchgeo.com*. For determining the location of mines we used the Raw Materials Database of SNL Metals and Mining.

<sup>11</sup>As can be seen, the survey is not equally balanced in terms of male and female respondents. To adjust for this, in all regressions we use survey weights.

<sup>12</sup>On the scale from 1 to 10, 1 represents that one is not willing to take any risk and 10 means that one is willing to take very much risk.

<sup>13</sup>On the corruption scale of 1 to 5, 1 represents "never", 5 "always" and 2 "seldom".

## Econometric Method

The two dependent variables that we use capture the very first two stages of entrepreneurship. In the first stage a *potential entrepreneur* discovers a business opportunity and *tries* to exploit it for the purpose of starting a new venture. The first dependant variable *Trial* is a dummy equal to 1 if the respondent positively answers the question “Have you ever tried to set up a business?”. It is only in the second stage of entrepreneurship that the *nascent entrepreneur starts* operating the new venture. The second dependant variable under study is *Startup*. It is a binary variable equal to 1 if the respondent positively answers the question “Did you manage to set it up?”.

Note the use of the term “set up”. The questions are not about founding or registering a company, nor about making profits or sales, but about a new business’s vague starting line left to the subjective definition of the respondent. This comes with the obvious pitfall that each respondent’s understanding of setting up a business is different. It could be that respondents’ definitions of business startup are culturally determined and thus including country fixed effects and clustering errors is a must. Nevertheless, the fact remains that our measure of nascent entrepreneurship is noisy.

In a Western context, where there are clear, standard legal procedures that need to be followed so as to consider a company founded, such subjective definitions of starting a business would be misplaced.<sup>14</sup> In a transition context, however, where legal frameworks are in a constant reform process, where contracts are not always enforced by courts and where market mechanisms can fail to function, it is difficult to find an objective definition that remains unchanged over the years.<sup>15</sup> Moreover, in such an environment of bureaucratic hurdles and high legislative uncertainty, many entrepreneurs prefer to not even bother starting a formal business. A special feature of the transition region is the relatively high level of informal businesses (Estrin, Meyer, and Bychkova 2006). An objective formal measure of entrepreneurship would fail to capture the rich entrepreneurship of the informal sector, which can be an important part of a transition economy (McMillan and Woodruff 2002). We, thus, believe that in the context of transition economies the trade-off between noise and breadth of the measure of entrepreneurship is worth making. Moreover, this definition of entrepreneurship is in the spirit of the call of Estrin, Meyer, and Bychkova (2006) for a new definition of entrepreneurship befitting the unique transition environment.

The main explanatory variable is the level of diversity in an individual’s community, which is proxied by the PSU in which each respondent lives. Following Harrison and Klein

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<sup>14</sup>Previous studies have observed that also in Western contexts the operationalization of the definition of nascent entrepreneurship is not straight-forward (Shaver, Carter, Gartner, and Reynolds (2001); Reynolds (2009)).

<sup>15</sup>Note also that the trial question refers to having *ever* tried to set up a business. Thus the ventures could have been set up anytime between 1989 and 2010. Our definition of entrepreneurship thus needs to fit through-out this entire period of extreme change.

(2007), we define diversity to mean variety diversity, which captures the distribution of qualitative differences of within-unit members. In particular, we use data on each respondent's self-identified religion to calculate an index of religious fractionalization.<sup>16</sup> Blau's index or fractionalization (Blau, 1977; Easterly & Levine, 1997) measures the probability that two randomly selected individuals in a given community belong to different religious groups. The formula for diversity of locality  $l$ , calculated as fractionalization, is:

$$\text{Diversity}_l = 1 - \sum_{r=1}^8 s_{rl}^2,$$

where  $s_{rl}$  is the proportion of respondents within locality  $l$  that belong to the religious group  $r$ .<sup>17</sup>

To uncover the relationship between entrepreneurship and religious diversity, we estimate a separate probit regression for each stage of entrepreneurship:

$$Pr(\text{Trial}_{ilk} = 1 | X_i, Y_l) = \Phi(\delta_0 + \text{Diversity}_l \beta + X_i \delta_1 + Y_l \delta_2 + \lambda_k + \epsilon_{ilk}),$$

$$Pr(\text{Startup}_{ilk} = 1 | X_i^*, Y_l, \text{Trial}_i = 1) = \Phi(\gamma_0 + \text{Diversity}_l \xi + X_i^* \gamma_1 + Y_l \gamma_2 + \lambda_k + \eta_{ilk}).$$

where  $\text{Trial}_{ilk}$  and  $\text{Startup}_{ilk}$  are binary variables equal to unity if individual  $i$  from locality  $l$  and country  $k$  ever tried to set up a business, respectively succeeded at setting it up.  $\Phi(\cdot)$  is the cumulative distribution function of the normal distribution. The coefficients of interest are  $\beta$  and  $\xi$ , which measure the correlation between the first two stages of entrepreneurship and the religious diversity of the community,  $\text{Diversity}_l$ . The two regression equations contain a vector of individual controls  $X_i$  for trial and  $X_i^*$  for startup, which contains all elements of  $X_i$  plus two extra variables measuring access to finance. Included is also a vector of locality controls  $Y_l$ . In each regression we include country fixed effects,  $\lambda_k$ , to eliminate the effect of slowly changing country-level variables that could confound the results. Since the responses of individuals within a country will likely be correlated, we also cluster the errors,  $\epsilon_{ilk}$  and  $\eta_{ilk}$  at the country level. All regressions also include sample weights which ensure that the data are representative at the country level.

Since our analysis relies on a cross-sectional data set, it is essential to incorporate a wide range of control variables in the model in order to minimize omitted variable bias. Guided by previous research, we include variables measured at both the individual and at the PSU level (for example see Dobrev and Barnett (2005); Giannetti and Simonov (2009)). In addition, since diversity is calculated at the PSU level, it is essential to account

<sup>16</sup>See Section 3.5 for a discussion of the potential pitfalls of this measure and robustness checks.

<sup>17</sup>The 8 religious groups in our dataset are: Atheistic / Agnostic / None; Buddhist; Jewish; Orthodox Christian; Catholic; Other Christian including Protestant; Muslim; Other.

for other local variables in order to avoid spurious results.

Including various control variables can, however, include biases in the estimations. First, there is the problem of endogeneity. Second, there is the argument of Spector and Brannick (2011) against the inclusion of unnecessary control variables. Third, selection bias could be included due to missing observations. For these reasons, the precise estimate of the correlation between diversity and entrepreneurship in the regressions with control variables should be taken with a grain of salt. Nevertheless, we also estimate the probit regressions without including any controls so as to understand the size and direction of these biases.

In the regressions, we include a respondent's gender, age, risk-taking attitude and urban residence (Demirgüç-Kunt, Klapper, and Panos 2011). We also account for a respondent's educational attainment, since this is positively associated with entrepreneurship (Ardagna and Lusardi (2008); George, Kotha, Parikh, Alnuaimi, and Bahaj (2011)). As Audretsch, Boente, and Tamvada (2007) argue, religion influences the decision to become an entrepreneur, so we control for an individual's religion, and thus also make sure that the effect of religious fractionalization comes from diversity itself and not from the specific religion to which an individual belongs to.

Research argues that respondents who have more access to capital, income and connections will be more likely to both try to start a business and succeed in setting it up, so we control for all three factors (Khayesi and George (2011), Kotha and George (2012)). The survey provides information on whether the entrepreneur tried to borrow and was successful or unsuccessful in doing so when trying to found the business (with the omitted category those respondents that did not try to borrow). Instead of controlling directly for individual income and exposure to social networks, we capture both of these variables by including each respondent's father's education level and whether the respondent or any member of her family were members of the Communist party (see Djankov, Miguel, Qian, Roland, and Zhuravskaya (2005); Djankov, Qian, Roland, and Zhuravskaya (2006)). We do this for two reasons. Not only are households reluctant to respond to direct questions about income or wealth, but there may also be reverse causality from past entrepreneurial experiences (which are part of our dependent variables) to current income levels. Moreover, Communist party membership accounts for the fact that in the initial phase of transition nomenclature networks were used for bridging lacking market structures (Estrin, Meyer, and Bychkova 2006).

At the locality level, we calculate the variables by aggregating individual responses to various questions in LiTS at the PSU level. For community wealth, we aggregate each respondent's perceived place on a 10-step income ladder. To measure the quality of informal institutions, we use a respondent's score of trust in other people. To measure the degree of local corruption, we use information on the number of respondents who believe that people like them have to make unofficial payments or gifts when requesting official documents or when going to courts for a civil matter. Previous work has explored

extensively the link between these three variables and entrepreneurship (see Aidis, Estrin, and Mickiewicz (2008); George, McGahan, and Prabhu (2012)).

Geographic characteristics which enable easy transportation access, such as low altitude or being located close to a river or sea, may encourage both the formation of diverse societies and entrepreneurship (Michalopoulos and Papaioannou 2013). We therefore include the altitude, latitude and longitude of a locality, as well as the distance to the border, distance to the capital and a dummy if the locality has access to a waterway. In addition, we capture the importance of natural resources by also including the distance to the nearest mine. We also control for the adult population of each PSU, since larger PSUs may be more diverse (Harrison and Klein 2007).

Identification in cross-country regressions is based on the strong assumption that there are no unobservable factors that would correlate with both individual entrepreneurship and locality diversity. Our inclusion of country fixed effects and a battery of observable individual and locality controls is therefore crucial. It is, however, unlikely that this approach will completely eliminate the problem of omitted variable bias. Therefore, we also adopt a second strategy. Following Nunn and Wantchekon (2011), we apply the insight of Altonji, Elder, and Taber (2005) that selection on observables can be used to calculate the potential bias from unobservables. In particular we calculate the ratio developed by Bellows and Miguel (2009) for the case when the explanatory variable is continuous. The ratio is  $\frac{\beta^F}{\beta^R - \beta^F}$ , where  $\beta^F$  is the coefficient for diversity in the regression with the full set of controls and  $\beta^R$  is the coefficient for diversity in the regression without any controls. Bellows and Miguel (2009) show that this is a consistent measure for how many times higher selection on unobservables must be than selection on observables to completely explain away the effect of diversity.

## 3.4 Results

### Main Results

In Tables 3.2 and 3.3 we present regressions investigating the association between diversity and the first two stages of entrepreneurship. For each model, we present the raw probit coefficients along with the average partial effects calculated using the margins command in Stata. Due to the concerns explained above related to the inclusion of controls, we first calculate regressions without any controls in Columns 1 - 4. We see that a unit increase in religious diversity is associated with an 8% increase in trial and a 11% increase in startup. This very first model seems to validate Hypotheses 2 that expects a positive relationship between diversity and entrepreneurship. In Columns 5 - 8, we add only individual controls. The positive association between trial and diversity remains, but disappears between startup and diversity. In Columns 9 - 12, both individual and locality controls are added. A one unit increase in diversity is correlated with a statistically significant 5% increase in

trial. There is, however, no association between religious diversity and startup. Therefore, Hypothesis 2 is only partially validated. Increased religious diversity is only positively associated with the very first stage of entrepreneurship, trial, but not with the subsequent one, startup.

The control variables show several interesting patterns. Not all of the control variables matter for both entrepreneurial trial and success, pointing to the importance of different selection criteria at the two stages of entrepreneurship as emphasized in Hypothesis 1. While on average women are approximately 6 percentage points less likely to try to become entrepreneurs, they are no less successful than men in starting up once they try. Age has an inverted U-shaped relationship with entrepreneurial trial, but no relationship with startup. More risk loving individuals are about 2 percentage points more likely to both try to start a business and to startup. More education is positively associated only with entrepreneurial trial, but not with startup. Individuals that are wealthier and better connected (as proxied by the respondent's father's education and family membership in the communist party) are more likely to try to start a business, but no more likely to start it up. However, as expected, the businesses of respondents who were able to borrow are more likely to be able to start up.

When it comes to local-level controls, individuals in PSUs that are wealthier and with better informal institutions are less likely to try to start a business, but the effect is minor. It could be that in these locations respondents have other more profitable sources of employment. Neither of these two variables is significant in the startup equation, and the quality of local institutions - captured through the extent of corruption at the PSU level - is irrelevant for both potential and nascent entrepreneurs. None of the included PSU variables affect entrepreneurial startup, possibly because they are overshadowed by access to finance.

The main findings of Tables 3.2 and 3.3 are that diversity is positively associated with entrepreneurial trial, but not with entrepreneurial success. We now turn to calculate the ratio of Bellows and Miguel (2009) for the link between diversity and trial. For  $\beta^R$  we use the coefficient from Table 3.2, Row 1, Column 1 and for  $\beta^R$  the coefficient from Table 3.2, Row 1, Column 5. We obtain that selection on unobservables needs to be double (2.16) as high as selection on observables to wipe out our results. Such a magnitude is unlikely to happen (Altonji, Elder, and Taber 2008). Therefore, even in the light of remaining omitted variable bias, our results still stand.

## Moderators

For being able to understand how social capital moderates the association between diversity and entrepreneurship (trial), we include in the probit regressions three interaction terms. As explained in Section 3.2, social capital has various definitions. Therefore, we try to capture through different variables various aspects of social capital. The first variable is



*Friends* which is equal to 1 if the respondent meets frequently (more than once a month) with his friends. We expect this variable to be a proxy of how densely connected the social group of a respondent is. It can, thus, be seen as a measure of network closure. The second variable we examine is *Weak Ties*, a dummy variable equal to 1 if the respondent knows someone, other than relatives, friends, classmates or boss, who he can ask for help. This is a measure of access to weak ties. The third and last variable is *Internal*, a dummy equal to unity if the respondent believes that the factors most important to succeeding in his country are effort and hard work or intelligence and skills.<sup>18</sup> We use this variable as a proxy for internal locus of control, which is defined as the belief that one can control his life and that this is not determined by external factors that they cannot influence (Rotter 1966). Previous studies have found that people who believe to be in control of the events in their lives, a personality feature that tends to be relatively stable throughout life, are more likely to bridge structural holes (Kalish and Robins 2006). We thus use the variable *Internal* as a proxy for being in the (psychological) position to bridge structural holes.

Table 3.4 reports the results of probit regressions examining the interaction effects of social capital and entrepreneurial trial and startup. Hypothesis 3 suggests that social capital will interact with diversity to positively affect entrepreneurship. The coefficients on the controls remain largely the same, and to conserve space we omit them from the table. Since it is not possible to compute marginal effects for interaction terms, we only present the raw probit coefficients in the tables. Still, the significance of the raw coefficients on the interaction terms indicates that these variables improve the goodness of fit of the econometric model (Williams 2012).

The results of Columns 1 and 2 from Table 3.4 contradict Hypothesis 3. Social capital understood as closure does not positively moderate the association between diversity and entrepreneurship. The coefficient of the interaction term between *Diversity* and *Friends* is significant at the 5% level for Trial and at the 10% level for Startup and has in both cases a negative sign. Respondents who meet frequently with friends do not benefit from diversity in neither their trial nor startup attempts. Meeting frequently with friends is, however, positively associated with a higher probability to try to set up a new business, but not with the probability to start it up. These results suggests that respondents who are not embedded in a dense network can draw more benefits from diversity in their entrepreneurial attempts.

The results of Columns 3 and 4 partially confirm Hypothesis 3. Social capital, this time understood as access to weak ties, does positively moderate the association between diversity and entrepreneurship, but only for trial. The coefficient of the interaction term between *Diversity* and *Weak Ties* is significant at the 1% level for Trial, but insignificant for Startup. Respondents who can access weak ties in times of need seem to be better equipped to harness the benefits of diversity so as to have a higher probability of trying

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<sup>18</sup>When *Internal* is equal to 0, the respondent believes that important to succeeding in his country are either political connections, breaking the law or something else.

to set up a business. Unfortunately, access to weak ties does not translate in more diverse localities to a higher probability of actually starting the business. Moreover, the coefficient of *Weak Ties* is insignificant for both Trial and Startup.

Columns 5 and 6 also partially confirm Hypothesis 3. Social capital, understood as bridging structural holes, does positively moderate the association between diversity and entrepreneurship, but only for trial. The coefficient of the interaction term between *Diversity* and *Internal* is significant at the 5% level for Trial, but insignificant for Startup. Respondents with an internal locus of control may be better equipped to bridge the structural holes that emerge in a diverse community and therefore may be more willing to try to set up businesses in diverse communities. However, those with internal locus of control in general try less to set a new business, as the negative coefficient of *Internal* alludes. It may be that they have other employment opportunities and therefore do not need to become self employed.

Hypothesis 3 is therefore confirmed only when social capital is understood as the opportunity to bridge structural holes and access to weak ties, but not as closure. As Tables 3.2 and 3.3 show, the association between diversity and entrepreneurship is found only at the stage of trial and therefore, it is only at this stage that bridging social capital moderates the association.

## 3.5 Robustness Checks

### Measure of Diversity

Averaging our main explanatory variable at the PSU level, when the survey is not representative at this level, is not ideal. Nevertheless, this is the closest we can get with our data to a measure of local diversity. Moreover, this approach has been taken before in the literature (for example Grosjean (2011); Grosjean and Senik (2011)). The main downside to this approach is that we have a noisy measure of community diversity due to a lack of sample representativeness. To account for this problem, we create for each PSU a dummy variable equal to unity if the probability of taking two random individuals from the PSU and they being from different religions is higher than 30%.<sup>19</sup> This new measure of community diversity suffers from arguably less measurement error. As can be seen in Column 1 and 2 of Table 3.5 diversity is still positively associated with Trial at the 10% significance level and still not associated with Startup, therefore generally the same picture remains as that painted by the main results. Another worry is that each PSU contains about 20 households and that this introduces small sample bias in the measure. We therefore calculate diversity as a fractionalization index also at the regional level, where there are on average 138 households per region. In Column 3 and 4 of Table

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<sup>19</sup>This is equivalent to our diversity index having a value higher than 0.3.

3.5, it can be seen that the main results remain confirmed.

## Endogeneity

Although diversity changes more slowly than entrepreneurship, it is possible that our results capture reverse causality to some extent. As the number of entrepreneurs in an area grows, exchange linkages become more complex, and cultural heterogeneity is more easily tolerated, which in turn increases migration and diversity. Since such a mechanism works over the long-term, we experimented with limiting the sample only to respondents that tried to start a business recently (after 2005) or not at all, and the results, available in Columns 5 and 6 of Table 3.5, are unchanged. We also show that there is no evidence that nascent entrepreneurs chose to move to more diverse areas, relative to non-entrepreneurs. In Column 7, we estimate a linear regression of *Residence*, which measures how many years a respondent has lived in his current locality of residence, on *Diversity*, *Trial* and their interaction term. Since the interaction coefficients of entrepreneurial trial and the diversity measures are insignificant, we conclude that our results are not driven by the differential sorting of entrepreneurs. Moreover, our results survive also if we control in our main regressions for whether the respondent has ever moved.<sup>20</sup>.

## Selection Bias

Since entrepreneurial startup is conditional on trial, an independent estimation of the startup equation could suffer from selection bias. In order to account for this we run a Heckman sample selection model using Stata’s `heckprobit` command. The difficulty of this specification is finding a variable that credibly affects trial, but not startup. We argue that the following individual-level variable can function as an exclusion restriction: a dummy for whether the respondent’s preferred type of employment is self-employment. We thus assume that the first stage of entrepreneurship (trial) is affected by internal motivation – the desire to become an entrepreneur – and not the second stage (startup), which we argue depends a lot more on external factors such as access to finance. Although this assumption is not ideal, it is the best feasible approach. The results from the Heckprobit estimates of entrepreneurial success are presented in Column 8. The selection coefficient (or the inverse Mill’s ratio, which isn’t reported) is significant, indicating that there is selection bias in the simple probit estimations. Nevertheless, the results are largely consistent, although some parameters are more precisely estimated than those from the main Table 3.3.

We also perform the following additional robustness checks, but do not include the tables in the paper (results available upon request). Our results survive when we aggregate all dependent and independent variables at the PSU level and when we cluster the

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<sup>20</sup>Results available upon request

standard errors by PSU to account for possible correlation between the individual and PSU-level variables. The results are also robust to using a logit specification.

### 3.6 Conclusion

Does religious diversity help or hinder entrepreneurship in the transition region? The answer is a clear no when it comes to hindering: we find no negative associations. But does local religious diversity help? The answer here is more nuanced: yes, but not in all stages of entrepreneurship. It is positively significant in the trial stage, but insignificant in the subsequent startup phase. The individuals most fit to benefit in their trial from local religious diversity are those that have social capital in the sense of capacity to bridge over structural holes and access to weak ties, but not necessarily those that have social capital of the closure type.

There do, however, remain other possible explanations that may account for the patterns observed in the data. In particular, our approach assumes that local religious diversity is not correlated with omitted characteristics at the individual or locality level. Moreover, it is possible that entrepreneurship directly affects diversity. We use three interrelated approaches to address these concerns. First, we control for a wide variety of individual and PSU-level characteristics, ranging from a respondent's religion to PSU-level corruption and trust. We also include country fixed effects and a battery of PSU-level geographic controls in all regressions. Second, using the approach developed by Altonji, Elder, and Taber (2005), we calculate that the effect of unobservables needs to be at least two times higher than the effect of observables to explain away the diversity correlate, which is unlikely. Third, our results survive when we control for whether the respondent has ever moved, as well as when we limit our observations to only years after 2005, suggesting that reverse causality between entrepreneurship and diversity is less likely to be an issue. Although admittedly several of our control variables - such as our measures of social capital, risk attitudes, or PSU-level non-geographic controls - are less likely to be exogenous, our multi-pronged approach makes it less likely that our results capture simply a spurious correlation.

Why does religious diversity help in the trial phase of entrepreneurship, but not in actually starting up the new venture? A possible explanation is that the transition region contains mostly Kirznerian entrepreneurs, that are dependent on their environment for generating business opportunities. In this sense a religiously diverse environment gives rise to many more opportunities - due to access to new information, creative environment, or lacking public goods that need private substitutes. These extra opportunities, however, do not seem to translate to more startups in diverse communities. It could be that diversity does not necessarily generate the most lucrative opportunities. Or it could be, as this paper suggests, that beyond identification of opportunities diversity does little to help and

instead for exploitation of opportunities other individual and process-related variables, such as access to finance, matter. The disentangling of these possible explanations is left to future research.

Table 3.1: Means of Variables

	(1)	(2)	(3)	(4)
	Entire sample		Sub-sample of those that tried	
	Mean	Standard deviation	Mean	Standard deviation
Trial	0.14	(0.35)	1.00	(0.00)
Startup	—	—	0.63	(0.48)
Diversity	0.19	(0.21)	0.22	(0.22)
Male	0.40	(0.49)	0.53	(0.50)
Age	43.88	(16.76)	42.49	(13.31)
Muslim	0.27	(0.44)	0.23	(0.42)
Christian	0.63	(0.48 )	0.62	(0.48)
Risk Score	4.77	(2.62)	5.95	(2.72)
Secondary Education	0.68	(0.47)	0.67	(0.47)
Bachelor/Master's Education	0.21	(0.41)	0.28	(0.45)
Father's Education	9.32	(4.10)	9.91	(3.98)
Member Communist Party	0.24	(0.43)	0.30	(0.46)
Urban	0.59	(0.49)	0.62	(0.49)
Loan Accepted	—	—	0.27	(0.45)
Loam Rejected	—	—	0.09	(0.29)
Locality Average Wealth	4.33	(0.95)	4.27	(0.89)
Locality Average Trust	3.12	(0.68)	3.08	(0.67)
Locality Average Corruption	1.82	(0.78)	1.85	(0.76)
Locality Population	84,290.09	(307,594.98)	85,750.97	(323,595.66)
Locality Latitude	45.76	(4.90)	45.70	(4.65)
Locality Longitude	34.59	(22.60)	36.55	(26.48)
Locality Altitude	378.38	(419.56)	398.46	(442.70)
Locality Distance to Mine	64.79	(71.53)	60.86	(67.16)
Locality Distance to Capital	134.36	(266.73)	144.99	(323.82)
Locality Distance to Border	34.52	(52.63)	36.14	(53.39)
Locality on Water	0.41	(0.49)	0.43	(0.49)
Observations	21,725		3,046	

Table 3.2: Probit Regressions: Entrepreneurial Trial

	(1)	(2)	(3)	(4)	(5)	(6)
	b	margins_b	b	margins_b	b	margins_b
Diversity	0.38*** (0.10)	0.08*** (0.02)	0.33*** (0.12)	0.06*** (0.02)	0.26** (0.12)	0.05** (0.02)
Male			0.30*** (0.03)	0.06*** (0.01)	0.30*** (0.03)	0.06*** (0.01)
Age			0.05*** (0.01)	0.00*** (0.00)	0.05*** (0.01)	0.00*** (0.00)
Age <sup>2</sup>			-0.00*** (0.00)	— (0.00)	-0.00*** (0.00)	— (0.00)
Muslim			-0.05 (0.09)	-0.01 (0.02)	-0.08 (0.09)	-0.02 (0.02)
Christian			0.07 (0.05)	0.01 (0.01)	0.04 (0.04)	0.01 (0.01)
Risk Score			0.10*** (0.01)	0.02*** (0.00)	0.10*** (0.01)	0.02*** (0.00)
Secondary Education			0.32*** (0.07)	0.06*** (0.01)	0.32*** (0.07)	0.06*** (0.01)
College Education			0.44*** (0.08)	0.09*** (0.02)	0.44*** (0.08)	0.09*** (0.02)
Father's Education			0.01*** (0.00)	0.00*** (0.00)	0.01*** (0.00)	0.00*** (0.00)
Member Communist Party			0.16*** (0.03)	0.03*** (0.01)	0.15*** (0.03)	0.03*** (0.01)
Urban			-0.01 (0.03)	-0.00 (0.01)	0.01 (0.03)	0.00 (0.01)
Locality Avg. Wealth					-0.07*** (0.03)	-0.01*** (0.01)
Locality Avg. Trust					-0.07*** (0.02)	-0.01*** (0.00)
Locality Avg. Corruption					0.02 (0.04)	0.00 (0.01)
Geography Controls					✓	✓
Country F.E.	✓	✓	✓	✓	✓	✓
Obs.	32,302		22,779		21,725	
Pseudo $R^2$	0.02		0.11		0.11	

*Note.* Robust standard errors in parentheses clustered at the country level. The *Geography Controls* not listed in the table are: Locality Population, Locality Latitude, Locality Longitude, Locality Altitude, Locality Distance to Mine, Locality Distance to Capital, Locality Distance to Border, Locality on Water.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.3: Probit Regressions: Entrepreneurial Startup

	(1)	(2)	(3)	(4)	(5)	(6)
	b	margins_b	b	margins_b	b	margins_b
Diversity	0.32** (0.16)	0.11** (0.06)	0.18 (0.19)	0.05 (0.06)	0.19 (0.20)	0.06 (0.06)
Male			-0.02 (0.05)	-0.01 (0.02)	-0.02 (0.05)	-0.01 (0.01)
Age			0.01 (0.01)	0.00 (0.00)	0.01 (0.01)	0.00 (0.00)
Age <sup>2</sup>			-0.00 (0.00)	— (0.00)	-0.00 (0.00)	— (0.00)
Muslim			-0.10 (0.13)	-0.03 (0.04)	-0.08 (0.14)	-0.03 (0.05)
Christian			0.04 (0.09)	0.01 (0.03)	0.06 (0.10)	0.02 (0.03)
Risk Score			0.06*** (0.02)	0.02*** (0.01)	0.06*** (0.02)	0.02*** (0.01)
Secondary Education			0.11 (0.12)	0.03 (0.04)	0.12 (0.13)	0.04 (0.04)
College Education			0.21 (0.14)	0.07 (0.04)	0.20 (0.14)	0.06 (0.05)
Father's Education			0.01 (0.01)	0.00 (0.00)	0.01 (0.01)	0.00 (0.00)
Member Communist Party			-0.06 (0.05)	-0.02 (0.02)	-0.07 (0.05)	-0.02 (0.02)
Urban			-0.03 (0.06)	-0.01 (0.02)	-0.02 (0.06)	-0.01 (0.02)
Loan Accepted			0.46*** (0.06)	0.14*** (0.02)	0.45*** (0.07)	0.14*** (0.02)
Loan Rejected			-1.07*** (0.12)	-0.34*** (0.04)	-1.06*** (0.13)	-0.33*** (0.04)
Locality Avg. Wealth					0.02 (0.03)	0.01 (0.01)
Locality Avg. Trust					0.03 (0.05)	0.01 (0.02)
Locality Avg. Corruption					-0.04 (0.07)	-0.01 (0.02)
Geography Controls					✓	✓
Country F.E.	✓	✓	✓	✓	✓	✓
Obs.	4,106		3,172		3,046	
Pseudo $R^2$	0.07		0.16		0.16	

*Note.* Robust standard errors in parentheses clustered at the country level. The *Geography Controls* not listed in the table are: Locality Population, Locality Latitude, Locality Longitude, Locality Altitude, Locality Distance to Mine, Locality Distance to Capital, Locality Distance to Border, Locality on Water.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



Table 3.4: Probit Regressions: Moderators

	(1)	(2)	(3)	(4)	(5)	(6)
	Trial	Startup	Trial	Startup	Trial	Startup
	b	b	b	b	b	b
Diversity	0.528*** (2.96)	0.534* (1.88)	0.251** (2.08)	0.186 (0.92)	0.0491 (0.38)	0.129 (0.49)
Friends	0.101* (1.80)	0.0546 (0.59)				
Friends X Diversity	-0.317** (-2.27)	-0.406* (-1.86)				
Weak Ties			-0.0835 (-0.56)	-0.234 (-0.56)		
Weak Ties X Diversity			1.244*** (3.08)	0.983 (1.06)		
Internal					-0.0841** (-2.10)	0.0397 (0.40)
Internal X Diversity					0.279** (2.41)	0.0806 (0.29)
Individual Controls	✓	✓	✓	✓	✓	✓
Locality Controls	✓	✓	✓	✓	✓	✓
Country Fixed Effects	✓	✓	✓	✓	✓	✓
Obs.	21,725	3,046	21,725	3,046	20,615	2,921
Pseudo $R^2$	0.11	0.16	0.11	0.16	0.11	0.16

*Note.* Robust standard errors in parentheses clustered at the country level. The *Individual Controls* and *Locality Controls* not listed in the table are all of the control variables included in Tables 3.2 and 3.3. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 3.5: Robustness Checks

	(1) Diversity Trial b	(2) Dummy Startup b	(3) Regional Diversity Trial b	(4) Diversity Startup b	(5) Trial b	(6) Local Diversity Startup b	(7) Diversity Residence b	(8) Startup b
Diversity	0.086* (0.047)	0.082 (0.089)	0.481** (0.208)	-0.288 (0.439)	0.307** (0.138)	0.241 (0.342)	-0.098*** (0.020)	-0.022 (0.187)
Male	0.295*** (0.030)	-0.020 (0.048)	0.295*** (0.030)	-0.022 (0.048)	0.280*** (0.037)	0.099 (0.061)		-0.157*** (0.039)
Age	0.050*** (0.005)	0.009 (0.009)	0.050*** (0.005)	0.009 (0.008)	0.029*** (0.004)	0.004 (0.014)		-0.019*** (0.006)
Age <sup>2</sup>	-0.001*** (0.000)	-0.000 (0.000)	-0.001*** (0.000)	-0.000 (0.000)	-0.001*** (0.000)	0.000 (0.000)		0.000*** (0.000)
Muslim	-0.091 (0.093)	-0.086 (0.148)	-0.083 (0.092)	-0.115 (0.135)	0.012 (0.110)	-0.055 (0.167)		-0.021 (0.131)
Christian	0.035 (0.043)	0.058 (0.103)	0.025 (0.042)	0.042 (0.098)	0.081 (0.058)	0.011 (0.150)		-0.007 (0.079)
Risk Score	0.102*** (0.008)	0.057*** (0.017)	0.102*** (0.008)	0.056*** (0.017)	0.103*** (0.008)	0.034 (0.021)		-0.009 (0.013)
Secondary Education	0.324*** (0.073)	0.126 (0.131)	0.322*** (0.073)	0.117 (0.127)	0.259*** (0.057)	0.231 (0.150)		-0.077 (0.103)
College Education	0.446*** (0.082)	0.208 (0.147)	0.444*** (0.083)	0.203 (0.144)	0.400*** (0.072)	0.280* (0.162)		-0.112 (0.111)
Father's Education	0.014*** (0.005)	0.006 (0.009)	0.014*** (0.005)	0.006 (0.009)	0.013*** (0.005)	0.018 (0.014)		-0.003 (0.007)
Member Communist Party	0.153*** (0.032)	-0.068 (0.055)	0.153*** (0.032)	-0.067 (0.056)	0.094*** (0.036)	-0.161** (0.078)		-0.144*** (0.049)
Urban	0.018 (0.035)	-0.019 (0.062)	0.019 (0.035)	-0.008 (0.064)	0.012 (0.036)	0.021 (0.101)		-0.018 (0.054)
Loan Accepted		0.450*** (0.067)		0.453*** (0.067)		0.410*** (0.093)		0.368*** (0.055)
Loan Rejected		-1.063*** (0.126)		-1.064*** (0.126)		-1.189*** (0.145)		-0.812*** (0.096)
Trial							-0.021** (0.010)	
Trial X Diversity							-0.029 (0.032)	
Locality Controls	✓	✓	✓	✓	✓	✓		✓
Country Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Obs.	22,593	3,147	22,593	3,147	20,878	1,433	32,907	19,894
Pseudo. $R^2$	0.11	0.09	0.11	0.16	0.12	0.16	0.04 <sup>#</sup>	

*Note.* Robust standard errors in parentheses clustered at the country level. Same controls as in Tables 3.2 and 3.3. All regressions in Columns 1 - 6 are Probit regressions. Column 7 contains a Linear Regression. Column 8 contains a Heckprobit regression. In Columns 1 and 2 *Diversity* is calculated as a dummy variable equal to 1 if local religious fractionalization is higher than 0.3. In Columns 3 and 4 *Diversity* is calculated as regional religious fractionalization. In Columns 5 - 8 *Diversity* is calculated as local religious fractionalization. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 4 Shopping for Better Working Conditions

## 4.1 Introduction

When deciding if to buy a product, consumers do not always take into consideration just its price and quality as classical economics suggests, but also the operating practices under which it is produced (Ariely and Norton 2009). Consumers sometimes “vote with their dollars” against practices they do not agree with and for the type they want to prevail in the market (Dickinson and Hollander 1991). Either through avoidance - “boycotting” - or through favoring certain products - “*buycotting*” (Friedman 1996). Both actions can greatly affect firms.

On the one hand, boycotting can create great damage to a company. When poor labor conditions are in place, no matter how high the product is valued, some consumers completely abstain from buying it. For example in the early '90s, Nike Inc. suffered damage to its reputation due to its contracting of production to firms, which were coined “sweatshops” by protesters. The working environment was allegedly dangerous, difficult and poorly compensated. CEO Phil Knight came to admit that the brand became “synonymous with slave wages, forced overtime, and arbitrary abuse”, which eventually, combined with bad macroeconomic conditions, lead to a fall in earnings of 69 percent.<sup>1</sup> In response, Nike installed a code of conduct and spent over \$10 million a year to apply it. Nike hired staff to monitor production and gave access to a working conditions watchdog to randomly inspect its factories.<sup>2</sup> Thus Nike turned its image around, re-became a profitable business, and today is a model in the apparel industry for working conditions. A more recent scandal has been that of the harsh working conditions in Foxconn, a Taiwanese producer of consumer electronics to which Apple Inc. outsources its production. Apple’s response was to similarly enforce better labor practices by letting outside monitors into the factories.<sup>3</sup>

On the other hand, *buycotting* can create new markets for firms to tap into. Consumers often have a higher willingness to pay for goods that are produced under good working conditions. This is best exemplified by the success of Fairtrade products, which get certified if workers are paid “fair” wages and producers above-market “fair” prices.<sup>4</sup> The fair trade market is currently estimated at a growing \$6 billion, with sales having soared

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<sup>1</sup>Guthrie D. (3 September 2012). “Building sustainable and ethical supply chains”. Forbes. <http://www.forbes.com/sites/dougguthrie/2012/03/09/building-sustainable-and-ethical-supply-chains/> Retrieved August 1, 2015

<sup>2</sup>Bernstein A. (20 September 2004). “Nike’s New Game Plan for Sweatshops”. BusinessWeek. [www.businessweek.com/magazine/content/04\\_38/b3900011\\_mz001.htm](http://www.businessweek.com/magazine/content/04_38/b3900011_mz001.htm). Retrieved August 1, 2015.

<sup>3</sup> Stanley J. and A Satariano (13 January 2012). “Apple Opens Suppliers’ Doors to Labor Group After Foxconn Worker Suicides”. Bloomberg [www.bloomberg.com/news/2012-01-13/apple-opens-suppliers-doors-to-labor-group-after-foxconn-worker-suicides.html](http://www.bloomberg.com/news/2012-01-13/apple-opens-suppliers-doors-to-labor-group-after-foxconn-worker-suicides.html). Retrieved August 1, 2015.

<sup>4</sup>“Fair” in the sense of the Fairtrade label means that “employers pay decent wages, guarantee the right to join trade unions, ensure health and safety standards and provide adequate housing where relevant.[...] Prices aim to ensure that producers can cover their average costs of sustainable production.” (<http://www.fairtrade.net/what-is-fairtrade.html> Retrieved August 1, 2015.)

by 27% in 2010 alone.<sup>5</sup> In some industries, fair wages have become a standard way of doing business. For example, almost all US coffee retailers and roasters address the social issues of their coffee producers: either through Fairtrade or other certifications or by developing their own programs.<sup>6</sup> In 2012, the world's largest coffee chain, Starbucks Coffee Co., purchased 90 % of its coffee using its Coffee and Farmer Equity (C.A.F.E.) program, that offers fair prices to coffee growers.<sup>7</sup>

This paper sets out to examine the market that arises when consumers have social preferences towards the workers that produce the goods that they buy. Consumers base their purchasing decisions not only on price and quality, but also on wages, which are viewed as an aggregate of working conditions.<sup>8</sup> In the product market there is imperfect competition, captured by a random utility model. Firms are not altruistic, but choose prices and wages so as to maximize profits. The labor market's mechanics are abstracted away from: workers have a reservation wage and there is instant adjustment of the labor market to the needed quantity of goods that need to be produced.

The main difficulty in such a product market is the information asymmetry that exists between firms who know wages and consumers who do not. Section 4.4 presents the benchmark case in which wages are observable by consumers. In this case firms provide the socially optimal level of wages, while extracting a positive mark-up. The vast majority of products found on the market nowadays offer no information whatsoever about the working conditions under which they were produced. Consumers, thus, have no chance of satisfying their need for, or even revealing their, altruism towards workers. Section 4.4 shows how there is no credible way for firms to signal anything but the minimal wage, when consumers cannot observe wages. This situation illustrates how the behavior-attitude gap (Devinney, Auger, and Eckhardt (2010) and other sources discussed in the literature review from Section 4.2) arises in which although consumers have social preferences they cannot act out on them. Interestingly, the highest profit that firms can obtain is when information is complete. Therefore, there is an incentive for firms to disclose information.

When it is the firms that provide the information about working conditions, rational consumers doubt the veridity of such claims. One way of jumping over this stumbling block and creating a product that credibly caters to altruistic consumers is by offering access to production locations to third parties - credible monitors and labor watchdogs -, as the cases of Nike, Apple and Fairtrade have shown. In Section 4.4, I introduce an ideal

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<sup>5</sup>Clark S. and H. Walsh (December 23 2011). "Fair trade proving anything but in growing \$6 Billion Market." Bloomberg. [www.bloomberg.com/news/2011-12-23/fair-trade-proving-anything-but-to-farmers-with-6-billion-sales-at-stake.html](http://www.bloomberg.com/news/2011-12-23/fair-trade-proving-anything-but-to-farmers-with-6-billion-sales-at-stake.html). Retrieved August 1, 2015.

<sup>6</sup>Haight C. (Summer 2011). "The Problem with Fair Trade Coffee." [http : //www.ssireview.org/articles/entry/the\\_problem\\_with\\_fair\\_trade\\_coffee](http://www.ssireview.org/articles/entry/the_problem_with_fair_trade_coffee). Stanford Social Innovation Review. Retrieved August 1, 2015.

<sup>7</sup>See [http : //www.starbucks.com/responsibility/sourcing/coffee](http://www.starbucks.com/responsibility/sourcing/coffee).

<sup>8</sup>In general, elements that lead to better working conditions during production translate to higher costs for the firm: good salary, decent working hours, health and safety measures, health insurance, paid holidays, ample toilet breaks, etc.

monitor and show that he enables the altruistic quality of the good to exist on the market. The ideal monitor is a unique, non-strategic, credible, always telling the truth agent. In a way, he is similar to a technology that with a certain probability reveals information about each firm's wages.

In the entire class of symmetric pure-strategy equilibria, the monitor enables the provision of a higher than minimal wage for the workers, while guaranteeing firms a positive mark-up. Restricting consumers' possible beliefs about wages so as to be independent of observed prices, a unique equilibrium is obtained. Equilibrium price and wage are conveniently located between the prices and wages of the complete and incomplete information case. Therefore, firms make higher profits than in the incomplete information case and provide positive wages that are increasing in the inspection probability. By instituting an information revealing mechanism, such as that of the ideal monitor, the entire industry can raise its profits above the undesirable incomplete information case and approach profits similar to the complete information benchmark. All while providing workers with higher than minimal wages. Section 4.5 concludes. Appendix 4.6 contains all proofs.

## 4.2 Related Literature

Altruism takes place when an agent is willing to decrease his own material payoff so as to increase the utility of another agent. Sobel (2005) presents several ways through which preferences can be expanded to account for unselfish behavior in such a way as is observed in daily life and in laboratory experiments.<sup>9</sup> The most fitting to this paper is the view of the "Chicago School" (for example Stigler and Becker (1977)).<sup>10</sup> Preferences over general consumption goods do not require that the player derives utility only from goods, but also from other commodities that he himself transforms into consumption goods through his own production function. For example, generous behavior can give an individual a warm-glow (see Andreoni (1995)) or increase his status (see Carpenter and Myers (2010)). Altruism can thus be due to intrinsic or extrinsic motivation. My paper focuses on intrinsic altruism, which can be disentangled from extrinsic altruism. Friedrichsen and Engelmann (2013) find in a lab experiment with Fairtrade products that altruism due to extrinsic motivation such as image concerns does not crowd out altruism due to intrinsic motivation. My model, therefore, abstracts away from image concerns, and assumes that intrinsic warm-glow altruism dominates.

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<sup>9</sup>In the ultimatum game two players decide how to split a sum of money. One player proposes a split, which takes place only if the other player agrees to it. If players act selfishly, as supposed by classical economics, then the proposer should take most of the money and the respondent should accept this. Gaining something is better than gaining nothing. Interestingly, proposers tend to keep only around 60% and respondents tend to prefer obtaining nothing rather than obtaining less than on average 40% of the sum.

<sup>10</sup>Altruism can also be modeled as interdependent preferences (for example inequity aversion as proposed by Fehr and Schmidt (1999)), intrinsic reciprocity, constructive or destructive (for example Rabin (1993)) or as selfish behavior within a repeated game setting.

In my model, consumers feel a warm-glow from giving when buying a product from a firm with high wages. This is, as far as I am aware, one of the first papers to consider the existence of altruism in a market situation from the side of consumers towards workers. So far in the economic literature, altruism's impact on markets has been analyzed from the point of view of altruism between consumers (Dufwenberg, Heidhues, Kirchsteiger, Riedel, and Sobel (2011)), between the worker and the firm (Akerlof and Yellen (1990) among others), or between the consumer and the firm (Rotemberg 2011), but rarely between the consumer and the worker. Dufwenberg, Heidhues, Kirchsteiger, Riedel, and Sobel (2011) assume consumers have preferences over the distribution of consumption in society. Interestingly, under a separability condition, these other-regarding preferences cease to matter in a competitive market and consumers act as if having classical self-interest preferences. The other models define altruism as being intrinsic reciprocity and more specifically rely on destructive reciprocity, in that the firm is forced to act altruistically through threat of retaliation.<sup>11</sup> Akerlof and Yellen (1990) look at altruism between the worker and the firm under the assumption that workers expect firms to treat them fairly. Under the fair wage hypothesis, workers have a certain understanding of what a fair wage should be and change their level of effort accordingly. Thus workers can obtain, even under perfect competition wages higher than their productivity. Rotemberg (2011) analyzes altruism between the firm and the consumer in a monopoly model in which the firm can be altruistic towards consumers through its price setting behavior. In case it is not, a fraction of the consumers becomes angry and willing to incur costs to harm the firm that does not show a minimum level of altruism. Therefore, in the spirit of destructive reciprocity, consumers repay the unkindness of a high-price setting firm with the unkindness of buying less, even when utility from consumption is high. This situation can lead in a particular case to price rigidity.

Evidence for this particular warm-glow from giving comes from the broader literature on ethical consumption.<sup>12</sup> Ethical consumption is a loose term that can be understood as referring to consumers incorporating into their buying decisions various ethical issues such as labor conditions, human rights, animal well-being, the environment, etc. (Carrigan, Szmigin, and Wright (2004); Devinney, Auger, and Eckhardt (2010) ; DePelsmacker, Driessen, and Rayp (2005); Harrison, Newholm, and Shaw (2005); Carrigan and Attalla (2001); Boulstridge and Carrigan (2000); Shaw and Clark (1999); Creyer (1997)).<sup>13</sup> A

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<sup>11</sup> In my model, altruism can also be interpreted in the light of constructive reciprocity. The workers have been kind by producing a product that consumers value, so in return consumers, who feel a warm-glow, want to pay workers at least a fair wage and not just a minimal wage.

<sup>12</sup> Devinney, Auger, Eckhardt, and Birtchnell (2006) argue that the term "ethical consumption" is restrictive, implying that all other consumption is "unethical". As a replacement they coin the term "social consumption" and define another type of CSR - "*Consumer* Social Responsibility" as opposed to Corporate Social Responsibility.

<sup>13</sup> Ethical consumption can even have a political dimension (Newholm and Shaw (2007)). In this sense, political consumers want to align their values and beliefs as citizens with their actions as consumers. They choose certain goods so as to change institutional or market practices (Stolle, Hooghe, and Micheletti (2005); Micheletti (2003)). It is, however, unclear how important the political dimension of consumption

large portion of the empirical literature in the field is based on opinion polls of intentions, which consistently find strong support for ethical products (Auger and Devinney 2007). For example, Charlotte and Ames (2000) find that 68% of respondents would buy a product based on its responsible reputation. Yet, once consumers reach the checkout counter their ethical intentions do not always materialize .

This attitude - behavior gap could stem from two sources. First, it could be that the ethical attitude of consumers is not properly measured. Intention surveys suffer from incentive compatibility and social acceptance bias and likely exaggerate the importance of ethical issues to consumers (Devinney, Auger, and Eckhardt (2010)). Yet studies using willingness-to-pay estimates find that indeed some consumers are willing to put their money where their mouth is. DePelsmacker, Driessen, and Rayp (2005) estimate in a lab experiment on a Belgian sample that consumers are willing to pay on average a price premium of 10% for fair trade coffee. Danz, Engelmann, and Kübler (2012) find in a lab experiment that when firms choose both prices and wages consumers display fairness by purchasing from the firm with the highest prices and wages. Hainmueller, Hiscox, and Sequeira (2011) in a field experiment run in 26 stores of a major US grocery store chain find that by adding a fair trade label to bulk coffee sales increase by 10%.<sup>14</sup>

Second, it could be that the ethical behavior of consumers does not take place, despite their ethical attitude. This could be due a lack of relevant information, disbelief of ethical claims, paucity of ethical products on the market or products with competing ethical issues (Carrigan and Attalla (2001); Roberts (1996)). In this paper, I investigate the case in which consumers have an ethical attitude, but due to the delicate informational setting of ethical products, behavior may fail to materialize, as shown in Section 4.4, which explains this attitude-behavior gap. The economic problem is, as Hayek (1945) puts it, “the problem of utilization of knowledge not given to anyone in its totality”.<sup>15</sup>

In the relationships (consumer-firm, firm-worker) analyzed in the literature, altruism is visible to both parties. In contrast, consumers can rarely observe if a firm is generous towards its workers or not. Darby and Karni (1973) defined credence goods, a third type of goods in addition to search and experience goods as defined by Nelson (1970). Credence attributes can neither be observed prior to, nor post consumption. This could be either because the attributes are either unobservable or their assessment entails too

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normally is when no particular political issue has prominence. For example, most consumers associate fair trade only with fair wages, although at its core fair trade has a political message (IFAT (2004)).

<sup>14</sup> According to Adam Smith’s definition of justice, Watson (2007) argues that fair trade consumption does not represent an act of justice, but of beneficence. Fair Trade is an act of *private virtue*, because it reacts to the absence of a good. It is not an act of *public duty* because it does not react to the presence of a harm. In this sense, the desire to buy a product that offers workers better wages can also be philosophically differentiated from the desire to donate to charity.

<sup>15</sup> For Hayek the main challenge is finding a process through which decision makers are constantly communicated the knowledge which they need for solving their economic problems. One such process is, for Hayek, the price system, which communicates relevant information about supply and demand. As in my model the consumer additionally cares about the production process, prices are not a sufficient statistic and as I show a monitor is also needed.



high costs. The altruistic component of a product is a credence attribute: wages can neither be observed prior to, nor post consumption. Unlike in the case of search and experience goods, advertising and reputation cannot disclose the required information about the quality of the credence attribute.<sup>16</sup> Markets for credence goods therefore suffer from extreme information asymmetries.

Dulleck and Kerschbamer (2006) in their unifying model of the credence goods literature discuss the two main problems that arise: inefficient amount of treatment (over- or under-treatment) and over-charging.<sup>17</sup> In the extreme, Akerlof (1970)'s famous lemon problem occurs and the market breaks down altogether. This case shall be discussed as applied to my model in Section 4.4.

For prevention of fraud in my base model a mechanism for verifiability or liability needs to be provided on the market.<sup>18</sup> One possible way to provide verifiability is by introducing an intermediary. The literature on strategic transmission of information finds that profit maximizing intermediaries have the incentive to distort the message, no matter in what competitive setting they are in (Lizzeri (1999), Murooka (2013)). Single intermediaries acting on the market, although distorting the message, can sometimes enable the existence of higher quality credence goods (for example Feddersen and Gilligan (2001), Bottega and Freitas (2009)) but can also lead to the deterioration of quality on the market (Baron (2011)).

Another way of allowing for verifiability is by granting access to a monitor who does not offer advice, but simply observes the firm. Such a monitor is usually a non-governmental organization (NGO) who is not for profit and who has credibility due to external reasons. By assuming perfect commitment, I capture in an extreme way that the monitor is non-profit. Most closely related to my paper is Feddersen and Gilligan (2001), which analyzes the effect of an anti-consumption activist on the quality ("good" or "bad") produced by two firms competing in a Hotelling model. Unlike in my paper, the activist is strategic and wishes to decrease total consumption. Although anti-consumption activists are vocal, they are not necessarily the most relevant type of activists in such markets. The very specific utility function of the activist fits better to a credence good that is a bad, such as pollution. Moreover, the model of Feddersen and Gilligan (2001) is not applicable to the case of consumers caring about working conditions, because it assumes that the good quality product entails just higher fixed costs and not higher marginal costs. Lastly, as prices are not included in the model, the interesting trade-off between price and quality

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<sup>16</sup>This is because credence goods cannot be modeled in the context of a repeated game.

<sup>17</sup>The focus in the credence literature has been so far on treatment and diagnosis markets in which experts know more than the consumers not only about the quality provided, as in my model, but also about the quality needed.

<sup>18</sup>Dulleck and Kerschbamer (2006) identified three efficiency conditions for credence goods: (1) homogeneous customers; (2) existence of a commitment that customers will receive diagnosis and treatment in the same place (for example because of economies of scope between treatment and diagnosis); (3a) the type of treatment provided is verifiable or (3b) there exists a rule that makes the expert liable if he provides too low a quality. My base model fulfills the first two of these three conditions.

cannot be captured.

### 4.3 Model

Consider firms in industries that are not capital-intensive and in which labor costs are the main costs. Such industries can be for example manufacturing or agriculture in less developed countries. Then the marginal costs of producing a good are equal to wage costs, which can be taken to represent in addition to salaries the general working conditions in a firm.<sup>19</sup> Let each worker produce one product. The main assumption of the paper is that demand responds not just to the price of the product,  $p$ , but also to the (marginal) wage,  $w$ , offered by the company to its workers. A product can be viewed as being fair if during its production workers received more than the minimal wage, which is assumed to be zero in the model. In this regard, fairness can be viewed as a product quality through which firms can vertically differentiate themselves. Additionally, I shall assume that consumers have unobservable heterogenous tastes for the products, through which firms can horizontally differentiate themselves.

Following Perloff and Salop (1985) and Gabaix and Laibson (2006), consider the following random utility model with  $n$  firms and a continuum of consumers. Let firm  $i$ 's good give consumer  $k$  a decision utility of:

$$U_{ki} = q - p_i + v(w_i) + \varepsilon_{ki}, \quad (4.1)$$

where  $q \in \mathbb{R}_+$  is the average product-use valuation that consumers have over all products;  $p_i \in \mathbb{R}_+$  is the price; and  $w_i \in \mathbb{R}_+$  is the wage that the firm pays its workers per product.<sup>20</sup> The utility of not buying is normalized to 0.

The utility from altruism,  $v : [0, \infty) \rightarrow (-\infty, \infty)$ , is a continuously differentiable function that is strictly increasing ( $\frac{\partial v(w)}{\partial w} > 0$ ) and strictly concave ( $\frac{\partial^2 v(w)}{\partial^2 w} < 0$ ). The limit of marginal utility of altruism when the wage approaches the minimum wage is infinity ( $\lim_{w \rightarrow 0} \frac{\partial v(w)}{\partial w} = \infty$ ). At the minimum wage, utility from altruism is normalized to 0 ( $v(0) = 0$ ).<sup>21</sup> This can be interpreted in the spirit of Andreoni (1995): a consumer of a product obtains a warm-glow when doing something perceived as good ( $w > 0$ ), but also gets a cold-prickle when doing something perceived as bad ( $w < 0$ ).

$\varepsilon_{ki}$  is an idiosyncrasy of the consumer's preference with mean 0,  $E[\varepsilon_{ki}] = 0$ , dis-

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<sup>19</sup>Wage costs can be viewed as including elements from an average code of conduct such as: safer working conditions, social security, restrictions on overtime, paid holiday, a 40 hour work-week, breaks, the right to collective bargaining.

<sup>20</sup>If we assume that workers have an outside option that gives them a wage of 0, it is sufficient to restrict attention only to positive wages.

<sup>21</sup>If  $\bar{v}(\cdot)$  is the true utility from altruism, the normalized utility from altruism is  $v(w) = \bar{v}(w) - \bar{v}(0)$ . Moreover, a double normalization of the utility function  $U_{ki}$  (once for the utility of the outside option and once for the utility at the minimum wage) is possible without loss of generality because it is additively separable.

tributed independently and identically over firms. The common density function of the  $\varepsilon_i$  is differentiable and for any firm  $i$  satisfies  $f_i(\varepsilon_i) = f(\varepsilon)$ . The corresponding cumulative distribution function is  $F(\cdot)$ . Any given real number  $a$  will be greater than the idiosyncracies with probability:

$$Pr(a \geq \max_i \varepsilon_{ki}) = \prod_{i=1}^n Pr(a \geq \varepsilon_{ki}) = F(a)^n, \quad (4.2)$$

This model thus combines horizontal product differentiation, defined by  $\varepsilon_{ki}$ , with vertical product differentiation on a credence attribute  $w$ . A consumer prefers a product that maximizes his utility, given prices  $\tilde{P} = (p_1, p_2, \dots, p_n)$  and wages  $\tilde{W} = (w_1, w_2, \dots, w_n)$  for the  $n$  available products. If  $U_i \geq U_j$  for a given consumer, then  $p_j - p_i + v(w_i) - v(w_j) + \varepsilon_i \geq \varepsilon_j$ . Therefore, given  $\varepsilon_i$ , the probability that good  $i$  is preferred over good  $j$  is:

$$Pr(U_i \geq U_j | \varepsilon_i) = F(p_j - p_i + v(w_i) - v(w_j) + \varepsilon_i).$$

Since  $\varepsilon_j$  is distributed independently, the proportion of consumers who prefer product  $i$  over all the other products is:

$$Pr(U_i \geq \max_{j \neq i} U_j) = \int \prod_{j \neq i} [F(p_j - p_i + v(w_i) - v(w_j) + \varepsilon_i)] f(\varepsilon_i) d\varepsilon_i.$$

Throughout, I look for symmetric pure-strategy equilibria in which all firms charge the same price and pay the same wage. Since the  $\varepsilon_j$ 's are distributed identically, if all other firms  $j$  with  $j \neq i$  charge price  $p_j = p$  and pay wage  $w_j = w$ , then the probability that good  $i$  will be preferred is:

$$Pr(U_i \geq \max_{j \neq i} U_j) = \int F^{n-1}(p - p_i + v(w_i) - v(w) + \varepsilon_i) f(\varepsilon_i) d\varepsilon_i. \quad (4.3)$$

Since the utility of not buying is normalized to 0, a consumer will buy the preferred product  $i$  if its utility is greater than or equal to 0. This is the case whenever  $\varepsilon_i \geq p_i - v(w_i) - q$ . Further, normalize the mass of potential consumers to 1. Hence the residual demand of firm  $i$ ,  $D^i(\tilde{P}, \tilde{W})$  depends on the price vector,  $\tilde{P} = (p_i, p_{-i})$ , and on the wage vector,  $\tilde{W} = (w_i, w_{-i})$ , of firm  $i$  and of its competitors. Assuming symmetry, all other firms charge  $p_{-i} = p$  and pay  $w_{-i} = w$ . Therefore the residual demand in equilibrium of firm  $i$  at  $(P, W) = (p_i, w_i, (p, w)_{-i})$ , note the re-ordering of terms for convenience, is defined as:

$$D^i(P, W) = \int_{p_i - v(w_i) - q}^{\infty} F^{n-1}(p - p_i + v(w_i) - v(w) + \varepsilon_i) f(\varepsilon_i) d\varepsilon_i. \quad (4.4)$$

Let  $\delta(p_i, w_i) = \delta_i = q - p_i + v(w_i)$  be the average utility that the consumer derives from good  $i$ . Then the difference in average utility of good  $i$  from a randomly selected good of the competition is  $x(P, W) = x_i = \delta(p_i, w_i) - \delta(p, w) = p - p_i + v(w_i) - v(w)$ .

The residual demand can then be re-written as:

$$D^i(p_i, w_i, (p, w)_{-i}) = \int_{-\delta_i}^{\infty} F^{n-1}(x_i + \varepsilon_i) f(\varepsilon_i) d\varepsilon_i \quad (4.5)$$

In a symmetric equilibrium, when firm price and wage are equal to industry price and wage  $p_i = p$ ,  $w_i = w$ , symmetric demand can be written as:

$$D^{sym}(p, w) = \int_{p-v(w)-q}^{\infty} F^{n-1}(\varepsilon_i) f(\varepsilon_i) d\varepsilon_i \quad (4.6)$$

Note that unlike in the case when no outside good is available - the demands of the firms do not necessarily add up to 1. The total size of the market in a symmetric equilibrium  $nD^{sym}(p, w) \leq 1$  varies depending on the industry price and wage. The demand function has the following properties, a proof of which can be found in Appendix 4.6:

**Lemma 1.** *Properties of the demand function:*

- a) *Residual demand  $D^i(p_i, w_i, (p, w)_{-i})$  of firm  $i$  is strictly decreasing in firm price  $p_i$ .*
- b) *Residual demand  $D^i(p_i, w_i, (p, w)_{-i})$  of firm  $i$  is strictly increasing in firm wage  $w_i$ .*
- c) *Symmetric demand  $D^{sym}(p, w)$  is strictly decreasing in industry price  $p$ .*
- d) *Symmetric demand  $D^{sym}(p, w)$  is strictly increasing in industry price  $w$ .*
- e) *The derivative of the residual and symmetric demand according to wage can be re-written as:*

$$D_{w_i}^i = -v'(w_i)D_{p_i}^i, \quad D_w^{sym} = -v'(w)D_p^{sym}.$$

- f) *By assumption residual demand is concave in firm price:*

$$\frac{\partial^2 D^i(p_i, w_i, (p, w)_{-i})}{\partial^2 p_i} \leq 0.$$

- g) *Symmetric demand is concave in industry price:*

$$\frac{\partial^2 D^{sym}(p, w)}{\partial^2 p} \leq 0.$$

## 4.4 Analysis

### Benchmark

As a benchmark, assume that wages are observable to consumers. When choosing a profit maximizing wage-level, the firm faces the following trade-off: the wage paid to the workers

is a cost for the firm, but at the same time it creates a benefit to the consumers and, thus, increases demand. In equilibrium, to balance this trade-off, the firm will pay a wage up to the point where the marginal cost to the firm is equalized with the marginal benefit to consumers,  $1 = v'(w^*)$ . Beyond this point, the firm is better off increasing consumers' utility by decreasing prices than by increasing wages.

The optimal wage from the point of view of the firm is also the socially optimal wage. As shown above, the firm optimizes with regard to the benefit of the marginal consumer. In contrast, the social planner optimizes with regard to the benefit of the the average consumer. A social planner will choose an optimal wage level at a point where the average cost to the firm of providing that wage is equal to the average benefit that the consumers receive in utility. Since the marginal consumer and the average consumer have the same change in benefit from a wage change in my model, both a profit-maximizing firm and a social planner choose the same wage level.

The firm, however, does not choose the socially optimal mark-up. The optimal mark-up illustrates the balancing of the trade-offs from changing the price. When raising the price by one infinitesimal unit, while keeping the wage constant, the firm losses  $D_p^{sym}(p, w)$  marginal consumers with a value of  $p - w$ , but gains from  $D^{sym}(p, w)$  average consumers. At the optimum, the gains equal the losses. These results are formally stated in the following proposition:

**Proposition 1.** *Consider the complete information case. There exists a unique symmetric pure-strategy equilibrium. In this equilibrium firms pay workers the socially optimal wage level ( $v'(w^*) = 1$ ) and charge customers a strictly positive mark-up, which satisfies:*

$$p^* - w^* = -\frac{D^{sym}(p^*, w^*)}{D_p^{sym}(p^*, w^*)}.$$

The proof contains four steps, the details of which can be seen in Appendix 4.6. In the first step, for finding the market equilibrium, the profit maximization problem of the firm is solved. In the second step it is verified that the solution satisfies the second order conditions, so as to guarantee the existence of an equilibrium. In the third step it is shown that the market equilibrium is unique within the class of symmetric pure-strategy equilibria. In the last step, a social planner is considered who wants to maximize consumer and producer welfare by accounting for total surplus.<sup>22</sup>

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<sup>22</sup>As the intricacies of the labor market are abstracted away from, it is beyond this paper to model the welfare of the workers. The well-being of workers, other than the warm glow that consumers receive, is for the moment ignored. The welfare function considered here is the standard one found in the industrial organizations literature - meaning one that takes a developed country perspective ignoring the effect on developing countries.

## The Attitude - Behavior Gap

Remember the attitude-behavior gap from the ethical consumption literature: consumers have an ethical attitude, yet they do not act on it. The case of incomplete information absent an intermediary can be thought of as the simplest formulation of this gap. The straightforward interpretation is that consumers cannot fulfill their ethical desire because there is no credible way in which firms can communicate that they are indeed supplying products with such a characteristic.

The defining feature of a credence good market is that consumers cannot observe the provided quality, neither before, nor after consumption. It is most realistic to assume that working conditions in a firm are such a credence attribute. This leads to extreme information asymmetries between the buyer and the seller, which firms can exploit by making false claims about the true wage level. Due to the high risk of fraud, consumers expect the worse. Firms can therefore only credibly commit to providing the minimum wage. In the market for lemons described by Akerlof (1970) quality is also driven out of the market.

Assume that the symmetric equilibrium wage level would be strictly higher than zero ( $w^{in} > 0$ ). Then a firm would have an incentive to deviate and pay its workers a lower wage. As wages are unobservable, consumers cannot react to this decrease in the wage levels, and thus the deviating firm obtains higher profits through a higher mark-up and an unchanged demand. Hence, a positive wage level cannot be an equilibrium ( $w^{in} = 0$ ). To increase profits, firms then offer their so-called lower quality products in equilibrium at a discount to the complete information price ( $p^{in} < p^*$ ).

**Proposition 2.** *Consider the case of incomplete information. There exists a unique symmetric pure-strategy equilibrium. In this equilibrium, firms pay workers the minimum wage ( $w^{in} = 0$ ), which is lower than the complete information wage ( $w^{in} < w^*$ ), while charging a price lower than the complete information price ( $p^{in} < p^*$ ). The equilibrium price satisfies*

$$p^{in} = -\frac{D^{sym}(p^{in}, w^{in})}{D_p^{sym}(p^{in}, w^{in})}.$$

Appendix 4.6 contains the details of the proof. From the profit maximization problem of the firm follows the mark-up formula. In equilibrium, by the above logic, firms offer minimum wages, which are strictly lower than wages offered in the benchmark case. The properties of the demand function are used to show that under incomplete information prices are also lower than benchmark prices.

It is interesting to also answer the question of which informational situation the firm prefers. From the above proof it can be observed that mark-up under complete information is higher than mark-up under incomplete information. When moving from the complete information case to that of incomplete information, both wages and prices decrease. This has opposing effects on average utility: the wage decrease leads to a decrease in average

utility, but the price decrease leads to an increase in average utility. Because  $v'(w^{in}) > 1 = v'(w^*)$ , the wage effect dominates. Thus demand is higher under complete information. A higher mark-up and demand lead to a higher profit. Formally:

**Proposition 3.** *The profit of firms is strictly higher in the case of complete information than in the case of incomplete information:*

$$\Pi^* > \Pi^{in}.$$

The proof follows in three steps, the details of which are found in Appendix 4.6. First, it is shown that profits are increasing in average utility and second that mark-up is also increasing in average utility. In the third step, it is assumed for the sake of contradiction that incomplete information profits are higher than complete information profits. Using the properties of profits and mark-up from the first two steps and the concavity properties of the utility of altruism, it follows that the benchmark wage is strictly higher than the benchmark wage, which is obviously a contradiction. Therefore, it must be that in the benchmark case strictly higher profits are obtained than in the incomplete information case.

The existence of an outside good is crucial for obtaining the above result. Without an outside good, consumers always purchase, even if the utility they receive is infinitely low.<sup>23</sup> Therefore, the market demand is always equal to the mass of consumers, which in this case is 1. In the symmetric equilibrium, all firms have the same demand  $\frac{1}{n}$  and thus also the same mark-up and same profit (see Appendix 4.6 for the complete proposition).

## Monitor

As shown in the previous section, when wages are unobservable, the altruistic attribute of the good is not provided. Firms would also prefer to have a mechanism of credibly revealing information about their working conditions, as the highest profits that they achieve are under complete information. In this section, I explore a possible mechanism of revealing information inspired from the case of Nike. The story of Nike can be interpreted in the light of the results shown so far. Initially, for reasons outside the model, consumers believed that Nike was providing decent working conditions in its garments factories from Asia.<sup>24</sup> We can interpret this as Nike being in the complete information case.<sup>25</sup> An exogenous shock brought Nike in the incomplete information case where consumers were no longer willing to believe that anything but minimal wages were provided. In reaction to

<sup>23</sup>In a Hotelling model of competition this would have always been the case.

<sup>24</sup>Wilsey M. and Lichtig S. "The Nike Controversy: The Exploitation of Workers in Third World Countries". [http://www.stanford.edu/class/e297c/trade\\_environment/wheeling/hnike.html](http://www.stanford.edu/class/e297c/trade_environment/wheeling/hnike.html) Retrieved August 1, 2015.

<sup>25</sup> With probability  $\epsilon$  Nike provides bad working conditions and with probability  $1 - \epsilon$  Nike provides good working conditions. Consumers initially believe  $\epsilon$  to be null. An exogenous shock such as a new coverage can bring consumers to realize that  $\epsilon$  is positive.

this, a watchdog was permitted to randomly visit factories and reveal working conditions. I shall now show that is a profit-increasing strategy within my model.

Consider an information providing mechanism similar to the one put in place by Nike. Assume that a monitor acts as an information-supplying agent. The monitor has no utility of his own to maximize. He can costlessly observe the working conditions in firms' factories. Further, the monitor is perfectly committed and always tells the truth and consumers know this. The wage set by a firm is unobservable, but with probability  $\beta$  it is revealed by the monitor to consumers. The game  $\Gamma$  has the following stages:

- I. Firms simultaneously choose prices,  $p_i \in \mathbb{R}_+$ , and wage levels,  $w_i \in \mathbb{R}_+$ .
- II. Each firm is monitored with probability  $\beta$  by a *truth telling monitor*. For each firm  $i$ , the monitor sends the consumers a message  $m_i$  from a set of feasible messages  $E \subset \mathbb{R}$ . The message  $m_i$  is either equal to  $w_i$  if the firm has been monitored or equal to  $-1$  if the firm has not been monitored.
- III. Consumers observe all prices and messages and choose an action from the set of feasible actions  $A = \{0, 1, \dots, n\}$ , where 0 represents not buying anything and  $1, \dots, n$  represents the firm from which a good is bought.
- IV. Payoffs are given. Firm  $i$  obtains profit  $\Pi_i(P, W, M)$ , where  $P$ ,  $W$  and  $M$  are the price, wage and, respectively, message vectors. Consumer  $k$  of firm  $i$  obtains utility  $U_{ki}(p_i, m_i)$ .

In  $\Gamma$ , a pure strategy of firm  $i$  is  $s_i = (p_i, w_i)$ , which belongs to the set of pure strategies  $S_i \subset \mathbb{R}_+ \times \mathbb{R}_+$ , and a mixed strategy is a probability distribution over the strategies in  $S_i$ . A (mixed) strategy for a consumer (who sees all prices and messages) is the mapping  $s_c : \mathbb{R}_+^n \cup E^n \rightarrow \Delta A$ , where  $\Delta$  denotes the set of probability distributions over a set. The truth-telling monitor reveals information in an automatic fashion and therefore is a non-strategic player.

The equilibrium concept used to solve  $\Gamma$  is that of a pure-strategy Perfect Bayesian Equilibrium (PBE). Following Gibbons (1992), a PBE has to satisfy the following requirements. (i) First, uninformed players have beliefs, which are probability distributions over nodes in the information set that have been reached. (ii) Second, given these beliefs the strategies of the players need to be sequentially rational: that is the action taken at each information set by a player is optimal given the beliefs and the subsequent strategies played by other players. (iii) Third, beliefs are consistent with Bayes' rule whenever possible and the players' equilibrium strategies.

(iv) As a fourth requirement, I impose, in the spirit of a sequential equilibrium<sup>26</sup>, that the belief about firm  $i$ 's wage is uncorrelated with the price of other firms,  $p_{-i}$ , or with

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<sup>26</sup>Note that sequential equilibrium can not be used as a solution concept in a continuous action space game, such as  $\Gamma$ , as it is ill-defined to tremble on all actions with positive probability.



the messages sent about other firms,  $m_{-i}$ , and thus depends only on a firm's own price,  $p_i$ .<sup>27</sup> Then all classes of beliefs in a pure-strategy equilibrium with a truth-telling monitor have the following form:

$$\mu(w_i|p_i, m_i) = \begin{cases} 1, & \text{if monitored: } m_i = w_i \\ 1, & \text{if not monitored: } m_i = -1, p_i = \tilde{p}, \text{ and } w_i = \tilde{w} \\ 0, & \text{if not monitored: } m_i = -1, p_i = \tilde{p}, \text{ and } w_i \neq \tilde{w} \\ G_{p_i}(w_i), & \text{if not monitored: } m_i = -1 \text{ and } p_i \neq \tilde{p}, \end{cases}$$

where  $G_{p_i} : \mathbb{R}_+ \rightarrow [0, 1]$  is any distribution function of the firm  $i$ 's wage off the equilibrium path, given its price,  $p_i$ ;  $\tilde{p}$  is the equilibrium price and  $\tilde{w}$  is the equilibrium wage. When a firm's wage is not monitored, consumers assume that the firm is paying equilibrium wages and when it is monitored consumers believe the message of the truth-telling monitor.

### Entire Class of Pure-Strategy Symmetric Equilibria

The entire class of pure-strategy symmetric equilibria has two favorable characteristics. First, a monitor *always* enables the existence of the altruistic quality of the good. Because there is a positive probability that any firm will be monitored and because consumers greatly value any small change in wages away from the minimum, in all equilibria firms provide their workers positive wages. Second, firms always make a positive mark-up in the process.

**Proposition 4.** *In any pure-strategy symmetric Perfect Bayesian Equilibrium of game  $\Gamma$  firms will provide higher than minimal wages.*

The full proof by contradiction can be found in Appendix 4.6. An equilibrium with a minimal wage cannot exist because higher profits can be made by a firm that unilaterally deviates in wages by offering a infinitesimally small positive wage. This is due to monitoring revealing with positive probability a firm's wage and the assumption that the derivative of the utility of altruism is infinity at zero.

**Proposition 5.** *In any pure-strategy symmetric Perfect Bayesian Equilibrium,  $(\tilde{p}, \tilde{w})$ , mark-up is positive and has the following form:*

$$\tilde{p} - \tilde{w} = \frac{1}{\beta v'(\tilde{w}) - D_p^{sym}(\tilde{p}, \tilde{w})} \frac{D^{sym}(\tilde{p}, \tilde{w})}{D_p^{sym}(\tilde{p}, \tilde{w})}.$$

The proof follows from the condition that in equilibrium no firm can unilaterally deviate in wages, while keeping equilibrium prices. The mark-up formula is the complete information mark-up from Proposition 1 with two adjustments. First, at the optimal wage

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<sup>27</sup>Furthermore, my game implies that since messages cannot be incorrect, they are always believed.

marginal utility from altruism is not equal to unity as in the complete information case, hence  $v'(\tilde{w})$ . Second, firms are monitored with probability  $\beta \leq 1$ , unlike the complete information case where firms can be thought of as being constantly monitored ( $\beta = 1$ ).

### Price Independent Beliefs

In the general case described in the previous section there are multiple equilibria. A unique equilibria exists when beliefs are restricted. Consider only the equilibria in which consumers' beliefs about a firm's wage are independent of the firm's own price. Having price-independent beliefs, consumers believe with probability one that  $w_i = \tilde{w}$  both on and off the equilibria path whenever a firm is not monitored. Thus, I focus on equilibria in which consumers believe un-monitored firms to be paying workers equilibrium wages independent of what price they and others charge. The beliefs have the following functional form:

$$\mu(w_i|p_i, m_i) = \begin{cases} 1, & \text{if monitored: } m_i = w_i \\ 1, & \text{if not monitored: } m_i = -1 \text{ and } w_i = \tilde{w} \\ 0, & \text{if not monitored: } m_i = -1 \text{ and } w_i \neq \tilde{w}. \end{cases}$$

Such restricted beliefs have not only technical advantages, but also reflect situations in which consumers do not use the price of goods as signals of quality. This can be due to a certain trust in the norm that has been established, outside of the model, in a particular industry.

**Proposition 6.** *Consider the case of incomplete information with a truth telling monitor and the game  $\Gamma$  with price-independent beliefs. There is a unique symmetric pure-strategy equilibrium. In this equilibrium, firms provide a higher than minimal wage, but lower than the socially optimal wage under complete information ( $0 < \tilde{w} \leq w^*$ ). Firms charge a price below the complete information price, but above the incomplete information price ( $p^{in} < \tilde{p} \leq p^*$ ). Formally,*

$$v'(\tilde{w}) = \frac{1}{\beta},$$

$$\tilde{p} - \tilde{w} = -\frac{D^{sym}(\tilde{p}, \tilde{w})}{D_p^{sym}(\tilde{p}, \tilde{w})}.$$

The mark-up formula and wage equality follow from the first order conditions of the profit maximization problem, which can be seen in Annex 4.6. The comparison of this equilibrium to the benchmark case follows from the properties of the demand function in a similar manner as in the proof of Proposition 2. The proof of uniqueness is very similar to that in Proposition 1.

Through the existence of an information-supplying-agent, firms are able to increase

their profits above the incomplete information-case and can even reach the profit level of the complete information case if all firms are monitored with probability 1.

**Proposition 7.** *The profit of firms in the case of incomplete information with a truth-telling monitor ( $\beta \in (0,1)$ ) and game  $\Gamma$  with price-independent beliefs is strictly higher than in the case of incomplete information, but bounded from above by the complete information profit:*

$$\Pi^{in} < \tilde{\Pi} < \Pi^*.$$

The proof is very similar to that of Proposition 3, which establishes that the highest possible profits are in the benchmark case. Details are found in Appendix 4.6. Therefore, the more information there is on the market, the better.

## 4.5 Conclusion

I have analyzed the effect of an information supplying agent - a monitor - on a market that caters to the social preferences of consumers towards the workers that produce their products. As the stories of Nike and Apple have shown, monitors and watchdogs are a valuable approach that firms use to inform their altruistic consumers about working conditions. To focus on the value-added by this method, without other distractions such as message distortion, I chose an ideal monitor: non-strategic - without any ulterior motives, and thus credible in the eyes of the consumers - and always truth-telling. In this regard, the monitor can also be regarded as a credible information revealing technology.

In the age of smartphones, online shops and Google Glass, it is technologically possible to quickly and easily bring this knowledge to consumers without creating information overload. With portable devices consumers can scan products right at the point of sale and find out the pay of workers and even experience the working environment of a firm through photos and videos. One such mobile app is GoodGuide which provides for more than 120,000 products social, health and environmental ratings.<sup>28</sup> Firms can thus move beyond the fulfilment of a standard, to offering the exact wage and working conditions they deem necessary.

The good news is that in the entire class of pure-strategy equilibria, the presence of the monitor leads to workers receiving higher than minimal wages, while firms make positive mark-ups. In this sense, the monitor enables the existence of products on the market that cater to the altruistic preferences of the consumers. A unique symmetric pure strategy equilibrium exists when restricting consumers' beliefs. The equilibrium selected in this paper resembles a situation in which consumers have trust in the norm in the industry as a whole. In this equilibrium, firms make strictly higher than incomplete information

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<sup>28</sup>Morozov E. (30 September 2013). "Hey, Big Fairtrade Spender, Apps promote ethical purchases, but do they inspire deeper learning?". <http://slate.me/1gwxnr7>. Future Tense (Slate). Retrieved August 1, 2015.

profits and can even come close to attaining the highest possible profit - the benchmark profit. Thus a monitor enables the existence of a market that caters to the altruistic preferences of consumers towards workers.

Currently, the socially optimal outcome is calculated from a developed country perspective that takes only consumers and firms into account. An important extension is to introduce the well-being of workers in the welfare function. This can be done in at least two ways. First, if workers' welfare is measured by wages then, even with perfect monitoring, wages are not efficient as a higher benefit should be given to workers. Nevertheless, the introduction of a monitor is welfare improving for the workers as wages rise above the minimum. Second, workers' welfare can depend on both quantity of labor and wage level. The current model does not capture the trade-off between the wage level of a single worker and the quantity of workers that a firm is willing to hire for that wage level. For example, firms might prefer to replace labor with capital beyond a certain wage level. Then when wages go up few workers receive higher wages while the others are laid off.<sup>29</sup> In this situation it is not clear that the introduction of a monitor leads to welfare improvements for the workers. Nevertheless, even such an extended model remains a partial equilibrium analysis that ignores the intricacies of the labor market in developing countries. For a rigorous understanding of the welfare of workers in developing countries a general equilibrium perspective needs to be taken in future research.

A further extension is allowing monitors to not only reveal information to consumers but also to firms themselves about working conditions in their contractors' factories. In the globalized world in which we live in, most industries are vertically disintegrated. Firms outsource production to companies located in countries with lower labor costs. Although not in charge of the workers in production, firms are still held accountable for working conditions. Due to vertical disintegration a principal-agent problem occurs, which monitors can help manage. The analysis of additional benefits and effects of monitors is left to future research.

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<sup>29</sup>Assuming that consumers derive utility not only from the wage level, but also from the number of employed workers of a firm is not realistic, as the lack of news reports on this topic attest. Additionally needing to know the number of employees of a firm would impose too high informational demands on consumers.

## 4.6 Appendix

LEMMA 1.

*Proof.* a) Take the derivative of the demand function (4.5) with regard to own price:

$$\begin{aligned} D_{p_i}^i(p_i, w_i, (p, w)_{-i}) &= -F^{n-1}(-\delta(p_i, w_i))f(-\delta(p_i, w_i)) - \\ &- (n-1) \int_{-\delta(p_i, w_i)}^{\infty} F^{n-2}(x((p_i, p), (w_i, w)) + \varepsilon) f(x((p_i, p), (w_i, w)) + \varepsilon) f(\varepsilon) d\varepsilon < 0. \end{aligned} \quad (4.7)$$

b) Take the derivative of the demand function (4.5) with regard to own wage:

$$\begin{aligned} D_{w_i}^i(p_i, w_i, (p, w)_{-i}) &= v'(w_i)F^{n-1}(-\delta(p_i, w_i))f(-\delta(p_i, w_i)) + \\ &+ v'(w_i)(n-1) \int_{-\delta(p_i, w_i)}^{\infty} F^{n-2}(x((p_i, p), (w_i, w)) + \varepsilon) f(x((p_i, p), (w_i, w)) + \varepsilon) f(\varepsilon) d\varepsilon = \\ &= -v'(w_i)D_{p_i}^i(p_i, w_i, (p, w)_{-i}) > 0. \end{aligned} \quad (4.8)$$

c) Take the derivative of the symmetric demand function 4.6 with regard to industry price:

$$\begin{aligned} D_p^{sym}(p, w) &= -F^{n-1}(-\delta(p, w))f(-\delta(p, w)) - \\ &- (n-1) \int_{-\delta(p, w)}^{\infty} F^{n-2}(\varepsilon) f^2(\varepsilon) d\varepsilon < 0. \end{aligned} \quad (4.9)$$

d) Take the derivative of the symmetric demand function 4.6 with regard to industry wage:

$$\begin{aligned} D_w^{sym}(p, w) &= v'(w)F^{n-1}(-\delta(p, w))f(-\delta(p, w)) + \\ &+ v'(w)(n-1) \int_{-\delta(p, w)}^{\infty} F^{n-2}(\varepsilon) f^2(\varepsilon) d\varepsilon = \\ &= -v'(w)D_p^{sym}(p, w) > 0. \end{aligned} \quad (4.10)$$

e) See 4.8.

f) By assumption.

g) Follows from f).

□

PROPOSITION 1.

*Proof. Step 1: Market Equilibrium:* The profit of firm  $i$  charging  $p_i$  and paying the workers  $w_i$  is:

$$\Pi^{in} = (p_i - w_i)D^i(p_i, w_i, (p, w)_{-i}).$$

The profit maximization problem has no corner solutions.<sup>30</sup> Therefore, the price and wage that maximize the profit must satisfy the following first-order conditions:

$$\begin{cases} FOC1^* & D^i(p_i, w_i, (p, w)_{-i}) + (p_i - w_i)D_{p_i}^i(p_i, w_i, (p, w)_{-i}) = 0 \\ FOC2^* & (p_i - w_i)D_{w_i}^i(p_i, w_i, (p, w)_{-i}) - D^i(p_i, w_i, (p, w)_{-i}) = 0, \end{cases}$$

In a symmetric equilibrium,  $p_i = p = p^*$  and  $w_i = w = w^*$ . Using these values and equation (4.10) the first order conditions can be re-written as:

$$\begin{cases} FOC1^* & D^{sym}(p^*, w^*) + (p^* - w^*)D_{p_i}^{sym}(p^*, w^*) = 0 \\ FOC2^* & (p^* - w^*)v'(w^*)D_{p_i}^{sym}(p^*, w^*) + D^{sym}(p^*, w^*) = 0, \end{cases}$$

From *FOC1*, the mark-up equation is obtained:

$$p^* - w^* = -\frac{D^{sym}(p^*, w^*)}{D_{p_i}^{sym}(p^*, w^*)}. \quad (4.11)$$

Note that, mark-up is strictly larger than 0. Introducing this result into *FOC2* it follows that:

$$D(p^*, w^*, (p^*, w^*)_{-i})(v'(w^*) - 1) = 0.$$

Therefore the optimal wage level  $w^*$  is chosen such that:

$$v'(w^*) = 1. \quad (4.12)$$

This wage level is positive, due to the assumptions that  $v'(0) > 1$  and that the utility of altruism is a concave function.

*Step 2. Existence of the Symmetric Equilibrium:*

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<sup>30</sup>If a firm sets a price of zero (infinity), it makes negative (zero) profits and it can profitably deviate by increasing (decreasing) its price. To see that a minimum wage is not a solution, note that  $\frac{\partial \Pi}{\partial w} \Big|_{w=0} > 0$  because  $v'(0) = \infty$ ; hence a slight increase in wage leads to a profitable deviation. A wage of infinity leads to negative profits and a wage decrease allows for higher profits.

A sufficient condition for the existence of an interior symmetric equilibrium as defined in Step 1 is that demand is concave, which is assured by Proposition 1 f) and g).

To show this note that the solution  $(p^*, w^*)$  as defined in equations (4.11) and (4.12) is a maximum if it satisfies the second order conditions:

$$\begin{cases} SOC1^* & \Pi_{pp} = 2D_p^{sym} + (p - w)D_{pp}^{sym} < 0 \\ SOC2^* & \det H = \Pi_{pp}\Pi_{ww} - \Pi_{wp}^2 > 0, \end{cases}$$

where

$$\Pi_{ww} = (p - w)D_{ww}^{sym} - 2D_w^{sym} \quad (4.13)$$

and

$$\Pi_{wp} = (p - w)D_{wp}^{sym} + D_w^{sym} - D_p^{sym} \quad (4.14)$$

As  $D_p < 0$ , a sufficient condition for  $SOC1^*$  to be satisfied is that  $D_{pp} < 0$ , which holds by assumption (see Lemma 1).

As shown in Lemma 1 e),  $D_w$  is equal to  $-v'(w)D_p$ . Therefore  $D_{wp}^{sym} = -v'(w)D_{pp}^{sym}$  and  $D_{ww}^{sym} = -v''(w)D_p^{sym} + v'(w)^2 D_{pp}^{sym}$ . Introducing these equalities and evaluating the profit equations (4.13) and (4.14) at  $(p^*, w^*)$ , using  $v'(w^*) = 1$ , one has:

$$\Pi_{ww} \big|_{p=p^*, w=w^*} = -v''(w^*)(p^* - w^*)D_p^{sym} + \Pi_{pp}$$

and

$$\Pi_{wp} \big|_{p=p^*, w=w^*} = -\Pi_{pp}.$$

Therefore the  $SOC2^*$  holds if:

$$\det H \big|_{p=p^*, w=w^*} = -v''(w^*)(p^* - w^*)\Pi_{pp}D_p^{sym} > 0. \quad (4.15)$$

As shown in  $SOC1^*$ ,  $\Pi_{pp} < 0$  and demand is decreasing in price. Furthermore,  $v(\cdot)$  is concave:  $v'' < 0$ . Therefore the above inequality is true. As both second order conditions are satisfied,  $(p^*, w^*)$  is indeed the solution to the profit-maximization problem in the case of complete information.

### *Step 3. Uniqueness of the Symmetric Equilibrium:*

The symmetric equilibrium defined in Step 1 is unique within the class of symmetric interior equilibria. To show this note that any symmetric equilibrium has to satisfy  $FOC1^*$ , which can be re-written as:

$$-D_p^{sym}(p^*, w^*)(p^* - w^*) = D^{sym}(p^*, w^*). \quad (4.16)$$

The right-hand side of (4.16) is decreasing in price ( $D_p^{sym} < 0$ ), while the left-hand side is increasing in price ( $-D_{pp}^{sym} \geq 0$ ). Moreover, the right-hand side is positive for all finite prices  $p$ , given  $w$ , while the left-hand side of the equation is equal to 0 at  $p^* = w^*$ . Therefore, a single equality is obtained at a price higher than  $w^*$ . As there are no corner solutions to the profit maximization problem, this is the unique symmetric pure-strategy equilibrium.

*Step 4. Welfare Maximization:* The social planner will maximize the sum of producer and consumer surplus. Assume that the social planner wishes to impose symmetry, in that all firms charge the same price  $p$  and pay the same wage  $w$ .<sup>31</sup> Producer surplus defined as the sum of aggregated profits can then be written as:

$$PS = n(p - w)D^{sym}(p, w). \quad (4.17)$$

Consumer surplus is the aggregated utility of all consumers who buy products. When a consumer buys a good, he receives utility  $q - p + v(w) + \varepsilon$ , as defined in equation (4.1). For a consumer to buy the good, however, it must be preferred over all other  $n - 1$  available goods. Then the best alternative among all inside goods has the probability density function of the  $n$ -th order statistic (Casella and Berger (2001)):

$$nF^{n-1}(\varepsilon)f(\varepsilon).$$

Furthermore, it must also be that the utility from buying the preferred good is higher than that of the outside good. As there are  $n$  products with equal price and wage, consumer surplus is, therefore, defined as:

$$\begin{aligned} CS &= n \int_{-\delta(p,w)}^{\infty} (q - p + v(w) + \varepsilon) F^{n-1}(\varepsilon) f(\varepsilon) d\varepsilon = \\ &= n(q - p + v(w)) D^{sym}(p, w) + n \int_{-\delta(p,w)}^{\infty} \varepsilon F^{n-1}(\varepsilon) f(\varepsilon) d\varepsilon. \end{aligned} \quad (4.18)$$

The problem of the social planner, thus becomes:

$$\max_{p,w} n[q + v(w) - w] D^{sym}(p, w) + n \int_{-\delta(p,w)}^{\infty} \varepsilon F^{n-1}(\varepsilon) f(\varepsilon) d\varepsilon. \quad (4.19)$$

The first order conditions of a symmetric interior solution are:

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<sup>31</sup>I focus here on the symmetric case because, in fact, the maximum welfare is obtained under symmetry. A sketch of the proof of this statement follows. For obtaining maximum welfare, all firms should charge a wage  $w^o$  such that  $v'(w^o) = 1$ . Otherwise, if  $v'(w^o) > (<) 1$  for some firm, then a profitable deviation can be obtained by increasing (decreasing) both price and wage such that average utility (mark-up) stays constant, but mark-up (average utility) increases. For proving that all firms need to charge the same price, consider first a lemma which states that at welfare optimum consumers buy the good with the highest  $\varepsilon$ . If prices are not symmetric then the above lemma is contradicted.



$$\begin{cases} FOC1^o & n(q + v(w^o) - w^o)D_p^{sym}(p^o, w^o) - n(p^o - q - v(w^o)) \\ & F^{n-1}(p^o - q - v(w^o))f(p^o - q - v(w^o)) = 0 \\ FOC2^o & n(q + v(w^o) - w^o)D_w^{sym}(p^o, w^o) + n(v'(w^o) - 1)D^{sym}(p^o, w^o) + \\ & + nv'(w^o)(p^o - q - v(w^o))F^{n-1}(p^o - q - v(w^o))f(p^o - q - v(w^o)) = 0 \end{cases}$$

Using  $FOC1^o$  and Lemma 1,  $FOC2^o$  reduces to:

$$n(v'(w^o) - 1)D^{sym}(p^o, w^o) = 0.$$

As demand is positive, it follows that the socially optimal wage level satisfies the same equation as the wage level chosen by the profit maximizing firm in the case of complete information,  $v'(w^o) = 1$ , and therefore  $w^o = w^*$ .

Introducing into  $FOC1^o$  the formula for the derivative of demand in equilibrium,  $FOC1^o$  can be re-written as:

$$\begin{aligned} - (q + v(w^o) - w^o)F^{n-1}(p^o - q - v(w^o))f(p^o - q - v(w^o)) = \\ = (p^o - q - v(w^o))F^{n-1}(p^o - q - v(w^o))f(p^o - q - v(w^o)), \end{aligned} \quad (4.20)$$

which is satisfied only if price is equal to marginal costs,  $p^o = w^o$ .

□

## PROPOSITION 2.

*Proof. Step 1. Characterization of Equilibrium:* As argued in the text in Section 4.4, it follows that  $w^{in} = 0$  in any equilibrium. To find the optimal price, firm  $i$  will solve the following problem:

$$\max_{p_i} p_i D^i(p^{in}, 0, (p^{in}, 0)_{-i}), \quad (4.21)$$

which, using the symmetry assumption ( $p_i = p^{in}$ ) in the first order condition, leads to the unique solution:<sup>32</sup>

$$p^{in} = - \frac{D^{sym}(p^{in}, 0)}{D_p^{sym}(p^{in}, 0)}. \quad (4.22)$$

*Step 2. Comparison to Benchmark:* Since it is assumed that  $v(\cdot)$  is concave and that  $v''(0) > 1 = v'(w^*)$ , it immediately follows that  $w^{in} = 0 < w^*$ .

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<sup>32</sup>The optimal price cannot be zero (infinity), because profits would be zero and an increase (decrease) in price would lead to higher profits. There are therefore no corner solutions.

To see that  $p^{in} < p^*$ , suppose the opposite:  $p^{in} \geq p^*$ . As symmetric demand is decreasing in price, this implies that  $D^{sym}(p^{in}, 0) \leq D^{sym}(p^*, 0)$ . Furthermore, as  $w^* > 0$  and symmetric demand is increasing in wage, this leads to  $D^{sym}(p^*, 0) < D^{sym}(p^*, w^*)$ . Therefore:

$$D^{sym}(p^{in}, 0) < D^{sym}(p^*, w^*). \quad (4.23)$$

Since symmetric demand is concave in own price,  $-D_p^{sym}(\cdot)$  is increasing in price. Thus  $-D_p^{sym}(p^*, w^*) \leq -D_p^{sym}(p^{in}, w^*)$ , as  $p^* \leq p^{in}$ . Recall that  $D_{pw}^{sym} = D_{wp} = -v'(w)D_{pp}^{sym} > 0$ . Therefore  $-D_p^{sym}$  is decreasing in own wage, and thus  $-D_p^{sym}(p^{in}, w^*) < -D_p^{sym}(p^{in}, 0)$  due to  $w^* > 0$ . Therefore:

$$0 < -D_p^{sym}(p^*, w^*) < -D_p^{sym}(p^{in}, 0). \quad (4.24)$$

Inequalities (4.23) and (4.24) imply:

$$p^{in} = \frac{D^{sym}(p^{in}, 0)}{-D_p^{sym}(p^{in}, 0)} < \frac{D^{sym}(p^*, w^*)}{-D_p^{sym}(p^*, w^*)} < \frac{D^{sym}(p^*, w^*)}{-D_p^{sym}(p^*, w^*)} + w^* = p^*, \quad (4.25)$$

contradicting  $p^{in} \geq p^*$ . □

### PROPOSITION 3.

*Proof.* Re-write demand as a function of average utility  $\delta$ :  $D^{sym}(\delta(p, w))$ . Using the profit formulas derived in Propositions 1 and 2, profits in equilibrium can be written as:<sup>33</sup>

$$\Pi(\delta(p, w)) = \frac{D^{sym}(\delta(p, w))^2}{-D_p^{sym}(\delta(p, w))}. \quad (4.26)$$

*Step 1.* Profits are increasing in average utility  $\delta$ .

**Lemma 2.** *Taking the derivative of the symmetric demand with respect to own price is the same as taking the derivative of demand with respect to negative average utility:*

$$D_{-\delta}(\delta) = D_p(\delta), \quad D_{-\delta-\delta}(\delta) = D_{pp}(\delta).$$

Therefore, taking the derivative of the profit formula (4.26) with respect to negative average utility is the same as taking the derivative with respect to own price:

$$\frac{\partial \Pi}{\partial(-\delta)} = \frac{-2DD_p^2 + D^2D_{pp}}{D_p^2}. \quad (4.27)$$

As both  $D_p < 0$  and  $D_{pp} \leq 0$ , it follows that the numerator is strictly negative. In conclusion, profit is decreasing in minus average utility, which is the equivalent of being

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<sup>33</sup>For convenience drop the  $^{sym}$  for the rest of the proof.

increasing in average utility.

*Step 2.* Mark-up is increasing in average utility  $\delta$ .

The mark-up that the firm obtains for each sold product in both the complete and incomplete information case has the same functional form:

$$\mu(\delta(p, w)) = \frac{D(\delta(p, w))}{-D_p(\delta(p, w))}.$$

Following the same reasoning as in Step 1 and taking the derivative of the mark-up according to negative average utility:

$$\frac{\partial \mu(\delta)}{\partial(-\delta)} = \frac{-D_p^2 + DD_{pp}}{D_p^2} < 0,$$

therefore, mark-up is increasing in average utility.

*Step 3.* Suppose for the sake of contradiction that  $\Pi^{in}(\delta(p^{in}, 0)) \geq \Pi^*(\delta(p^*, w^*))$ . From Step 1 it follows that:

$$\delta(p^{in}, 0) \geq \delta(p^*, w^*) \iff p^* - p^{in} \geq v(w^*) - v(0),$$

which, using equations (4.11) and (4.22), can be re-written as:

$$w^* + \mu(\delta(p^*, w^*)) - \mu(\delta(p^{in}, 0)) \geq \int_0^{w^*} v'(z) dz. \quad (4.28)$$

As has been shown in Step 2, mark-up is increasing in average utility, and because average utility is higher under incomplete information than under complete information, it follows that:

$$\mu(\delta(p^*, w^*)) - \mu(\delta(p^{in}, 0)) \leq 0.$$

Therefore:

$$w^* \geq \int_0^{w^*} v'(z) dz. \quad (4.29)$$

Note that  $w^* > 0$  and  $v(\cdot)$  is concave. As  $v'(w^*) = 1$ , according to equation (4.12), it follows that  $v'(w) > 1, \forall w \in [0, w^*)$ . Then the above inequality implies that:

$$w^* \geq \int_0^{w^*} v'(z) dz > \int_0^{w^*} dz = w^*, \quad (4.30)$$

which is a contradiction. Therefore the initial assumption is false and  $\Pi^* > \Pi^{in}$ .  $\square$

#### PROPOSITION 4.

*Proof.* By contradiction. Assume that there exists an equilibrium  $(\tilde{p}, \tilde{w})$  in which firms pay their workers minimal wages  $\tilde{w} = 0$ . I shall show that this equilibrium cannot exist,

as higher profits can be made by a firm that deviates to  $(\tilde{p}, \epsilon)$ , where  $\epsilon > 0$ .

Let all firms except firm  $i$  play the equilibrium price and wage  $(\tilde{p}, 0)$ . If firm  $i$  deviates in wages and pays its workers a wage of  $w$ , while selling its product at the equilibrium price  $\tilde{p}$ , then according to the belief function 4.7 consumers will believe that the unmonitored firm is paying equilibrium wages  $\tilde{w} = 0$ . The profit of the deviating firm  $i$  will thus be:

$$\Pi_i^{dev}(\tilde{p}, w, (\tilde{p}, 0)_{-i}) = (\tilde{p} - w)[\beta D(\tilde{p}, w, (\tilde{p}, 0)_{-i}) + (1 - \beta)D(\tilde{p}, 0, (\tilde{p}, 0)_{-i})].$$

To see the effect of a wage increase on profits, take the derivative of profit according to the firm's wage and evaluate it at  $w = 0$ :

$$\left. \frac{\partial \Pi_i^{dev}(\tilde{p}, w, (\tilde{p}, 0)_{-i})}{\partial w} \right|_{w=0} = \beta \tilde{p} D_w(\tilde{p}, 0, (\tilde{p}, 0)_{-i}) - D(\tilde{p}, 0, (\tilde{p}, 0)_{-i}).$$

From Equation 4.8 it follows that  $D_w \Big|_{w=0} = v'(0)D_p$ . As  $v'(0) = \infty$  and Equation 4.7 shows that  $D_p$  is finite, then  $\left. \frac{\partial \Pi_i^{dev}(\tilde{p}, w, (\tilde{p}, 0)_{-i})}{\partial w} \right|_{w=0} = \infty$ . Therefore a firm can increase its profits by offering its workers an infinitesimally small positive wage  $\epsilon > 0$ . Thus, no equilibrium with minimal wages can exist. □

#### PROPOSITION 5.

*Proof.* Assume that all firms but one play the equilibrium price and wage  $(\tilde{p}, \tilde{w})$ . Let firm  $i$  be the one that deviates in wages and pays  $w$ , but keeps the equilibrium price  $\tilde{p}$ . Then according to the belief function 4.7, consumers will believe that the unmonitored firm  $i$  is nevertheless paying equilibrium wages  $\tilde{w}$ . Firm  $i$ 's deviation profit will be:

$$\Pi_i^{dev}(\tilde{p}, w, (\tilde{p}, \tilde{w})_{-i}) = (\tilde{p} - w)[\beta D(\tilde{p}, w, (\tilde{p}, \tilde{w})_{-i}) + (1 - \beta)D(\tilde{p}, \tilde{w}, (\tilde{p}, \tilde{w})_{-i})].$$

As  $(\tilde{p}, \tilde{w})$  is an equilibrium, then no profitable deviations in wages can exist for firm  $i$  and thus the following equality must hold:

$$\left. \frac{\partial \Pi_i^{dev}(\tilde{p}, w, (\tilde{p}, \tilde{w})_{-i})}{\partial w} \right|_{w=\tilde{w}} = 0,$$

which is equivalent to:

$$D_w(\tilde{p}, w, (\tilde{p}, \tilde{w})_{-i})\beta(\tilde{p} - w) - [\beta D(\tilde{p}, w, (\tilde{p}, \tilde{w})_{-i}) + (1 - \beta)D(\tilde{p}, \tilde{w}, (\tilde{p}, \tilde{w})_{-i})] \Big|_{w=\tilde{w}} = 0,$$

Rewriting,

$$\beta(\tilde{p} - \tilde{w})D_w^{sym}(\tilde{p}, \tilde{w}) - D^{sym}(\tilde{p}, \tilde{w}) = 0.$$

Using Lemma 1,  $D_w^{sym} = -v'(w)D_p^{sym}$ , gives the mark-up formula:

$$\tilde{p} - \tilde{w} = -\frac{1}{\beta v'(\tilde{w})} \frac{D^{sym}(\tilde{p}, \tilde{w})}{D_p^{sym}(\tilde{p}, \tilde{w})}.$$

□

#### PROPOSTION 6.

*Proof. Step 1: Characterization of Equilibrium:* When maximizing profits, the firm takes into consideration that it will be monitored with probability  $\beta$ , in which case consumers can observe the wage level that it has set. With probability  $1 - \beta$ , the firm will not be monitored and consumers act upon their beliefs about the wage level. Firm  $i$  therefore maximizes the following profit:

$$\Pi^{in} = \beta[(p_i - w_i)D^i((p_i, \tilde{p}), (w_i, \tilde{w}))] + (1 - \beta)[(p_i - w_i)D^i((p_i, \tilde{p}), (\mu(w|\tilde{w}, p, \tilde{p}), \tilde{w}))], \quad (4.31)$$

which, taking into consideration that  $\mu(w|\tilde{w}, p, \tilde{p}) = \tilde{w}$ , is equivalent to:

$$\Pi^{in} = \beta[(p_i - w_i)D^i((p_i, \tilde{p}), (w_i, \tilde{w}))] + (1 - \beta)[(p_i - w_i)D^i((p_i, \tilde{p}), (\tilde{w}, \tilde{w}))], \quad (4.32)$$

Therefore the first order conditions are:

$$\begin{cases} \widetilde{FOC1} & \beta[D^i((p_i, \tilde{p}), (w_i, \tilde{w})) + (p_i - w_i)D_p^i((p_i, \tilde{p}), (w_i, \tilde{w})) + \\ & + (1 - \beta)[D_i((p_i, \tilde{p}), (\tilde{w}, \tilde{w})) + (p_i - w_i)D_p^i((p_i, \tilde{p}), (\tilde{w}, \tilde{w}))] = 0 \\ \widetilde{FOC2} & \beta[(p_i - w_i)D_w^i((p_i, \tilde{p}), (w_i, \tilde{w})) - D^i((p_i, \tilde{p}), (w_i, \tilde{w}))] + \\ & + (1 - \beta)[-D_i((p_i, \tilde{p}), (\tilde{w}, \tilde{w}))] = 0 \end{cases}$$

Introducing the symmetric equilibrium conditions  $p_i = \tilde{p}$  and  $w_i = \tilde{w}$  into the first order conditions and replacing  $D_w^{sym} = -v'(w)D_p^{sym}$  leads to:

$$\tilde{p} - \tilde{w} = -\frac{D^{sym}(\tilde{p}, \tilde{w})}{D_p^{sym}(\tilde{p}, \tilde{w})} \quad (4.33)$$

and

$$v'(\tilde{w}) = \frac{1}{\beta}. \quad (4.34)$$

*Step 2. Uniqueness of the Equilibrium:*

To show that the equilibrium defined in Step 1 is unique within the class of symmetric interior equilibria note that any symmetric equilibrium has to satisfy  $\widetilde{FOC1}$ , which can be re-written as:

$$-D_p^{sym}(\tilde{p}, \tilde{w})(\tilde{p} - \tilde{w}) = D^{sym}(\tilde{p}, \tilde{w}). \quad (4.35)$$

The right-hand side of (4.35) is decreasing in price ( $D_p^{sym} < 0$ ), while the left-hand side is increasing in price ( $-D_{pp}^{sym} \geq 0$ ). Moreover, the right-hand side is positive for all finite prices  $p$ , given  $w$ , while the left-hand side of the equation is equal to 0 at  $\tilde{p} = \tilde{w}$ . Therefore, a single equality is obtained at a price higher than  $\tilde{w}$ . As there are no corner solutions to the profit maximization problem, this is the unique symmetric pure-strategy equilibrium.<sup>34</sup>

*Step 3. Comparison to Benchmark:* As  $\frac{1}{\beta} \geq 1$  and  $v''(\cdot) < 0$ , it follows that  $\tilde{w} \leq w^* = w^o$ . Further, because  $\lim_{w \rightarrow 0} v'(w) = \infty$ , it follows that  $\tilde{w} > 0 = w^{in}$ . Due to the relationship between wages in the different informational cases, it can be shown using the same proof by contradiction as in Step 2 of the proof of Proposition 2, that  $p^{in} < \tilde{p} \leq p^*$ .  $\square$

PROPOSITION 7.

*Proof.* This is very similar to the proof by contradiction of Proposition 3. To show that  $\Pi^{in} < \tilde{\Pi}$ , note that  $v'(w) > \frac{1}{\beta} \forall w \in [0, \tilde{w})$ . Then equation 4.30 changes to:

$$\tilde{w} \geq \int_0^{\tilde{w}} v'(z) dz > \frac{1}{\beta} \int_0^{\tilde{w}} dz = \frac{1}{\beta} \tilde{w},$$

which is a contradiction. To show that  $\tilde{\Pi} < \Pi^*$ , note that  $v'(w) \in (1, \frac{1}{\beta}), \forall w \in (w^*, \tilde{w})$ . Then equation 4.30 changes to:

$$w^* - \tilde{w} > \int_{\tilde{w}}^{w^*} v'(z) dz > \int_{\tilde{w}}^{w^*} dz = w^* - \tilde{w},$$

which is a contradiction.  $\square$

**Proposition 8.** *If there is no outside good, the profit of the firm does not depend on the observability of the wage:*

$$\Pi = \frac{1}{n^2(n-1) \int F(\varepsilon)^{n-2} f(\varepsilon)^2 d\varepsilon}.$$

---

<sup>34</sup>There are no corner solutions. If a firm sets a price of zero (infinity), it makes negative (zero) profits and it can profitably deviate by increasing (decreasing) its price. To see that a minimum wage is not a solution, note that  $\left. \frac{\partial \Pi}{\partial w} \right|_{w=0} > 0$  because  $v'(0) = \infty$ ; hence a slight increase in wage leads to a profitable deviation. A wage of infinity leads to negative profits and a wage decrease allows for higher profits.

*Proof.* If there is no outside good, a consumer will purchase a good also if it gives him negative utility, as long as it is the preferred good. Therefore residual demand under symmetry, when all other firms charge the same price becomes:

$$D^{sym}(p, w) = \int F^{n-1}(x_i(P, W) + \varepsilon_i) f(\varepsilon_i) d\varepsilon_i. \quad (4.36)$$

As all consumers buy a good, total demand will always be equal to 1. The demand of firm  $i$  will always be  $D^{sym}(p, w) = \frac{1}{n}$ . The optimal mark-up is also constant, no matter in what informational case the firm finds itself, and equal to:

$$\mu = \frac{1}{n(n-1) \int F(\varepsilon)^{n-2} f(\varepsilon)^2 d\varepsilon}. \quad (4.37)$$

As demand and mark-up are constant, so is profit. □





# References

- Ahuja, G. (2000). The duality of collaboration: Inducements and opportunities in the formation of interfirm linkages. *Strategic Management Journal* 21(3), 317–343.
- Aidis, R., S. Estrin, and T. Mickiewicz (2008). Institutions and entrepreneurship development in Russia: A comparative perspective. *Journal of Business Venturing* 23(6), 656–672.
- Akerlof, G. (1970). The market for lemons: qualitative uncertainty and the market mechanism. *The Quarterly Journal of Economics* 84, 488–500.
- Akerlof, G. A. and J. L. Yellen (1990). The fair-wage effort hypothesis and unemployment. *The Quarterly Journal of Economics* 105(2), 255–283.
- Aldrich, H. (1999). *Organizations evolving*. Sage.
- Aldrich, H. E. and M. A. Martinez (2001). Many are called, but few are chosen: An evolutionary perspective for the study of entrepreneurship. *Entrepreneurship Theory and Practice* 25(4), 41–56.
- Alesina, A., R. Baqir, and W. Easterly (1999). Public goods and ethnic divisions. *The Quarterly Journal of Economics* 114(4), 1243–1284.
- Alesina, A., A. Devleeschauwer, W. Easterly, S. Kurlat, and R. Wacziarg (2003). Fractionalization. *Journal of Economic Growth* 8(2), 155–194.
- Alesina, A. and E. La Ferrara (2002). Who trusts others? *Journal of Public Economics* 85(2), 207–234.
- Alesina, A. and E. La Ferrara (2005). Ethnic diversity and economic performance. *Journal of Economic Literature* 43(3), 762–800.
- Altonji, J. G., T. E. Elder, and C. R. Taber (2005). Selection on observed and unobserved variables: Assessing the effectiveness of Catholic schools. *Journal of Political Economy*.
- Altonji, J. G., T. E. Elder, and C. R. Taber (2008). Using selection on observed variables to assess bias from unobservables when evaluating Swan-Ganz catheterization. *The American Economic Review*, 345–350.

- Andreoni, J. (1995). Warm-glow versus cold-prickle: the effects of positive and negative framing on cooperation in experiments. *The Quarterly Journal of Economics* 110(1), 1–21.
- Ardagna, S. and A. Lusardi (2008). Explaining international differences in entrepreneurship: The role of individual characteristics and regulatory constraints. Technical report, National Bureau of Economic Research.
- Ariely, N. and M. Norton (2009). Conceptual consumption. *Annual Review of Psychology* 60, 475–99.
- Audretsch, D. B., W. Boente, and J. P. Tamvada (2007). Religion and entrepreneurship. Technical report, Jena Economic Research Papers.
- Auger, P. and T. M. Devinney (2007). Do what consumers say matter? The misalignment of preferences with unconstrained ethical intentions. *Journal of Business Ethics* 76, 361 – 383.
- Bacharach, S. B., P. A. Bamberger, and D. Vashdi (2005). Diversity and homophily at work: Supportive relations among white and African-American peers. *Academy of Management Journal* 48(4), 619–644.
- Baron, D. (2011). Credence attributes, voluntary organizations, and social pressure. *Journal of Public Economics* 95(11/12), 1331–1338.
- Batjargal, B. (2003). Social capital and entrepreneurial performance in Russia: A longitudinal study. *Organization Studies* 24(4), 535–556.
- Bellows, J. and E. Miguel (2009). War and local collective action in Sierra Leone. *Journal of Public Economics* 93(11), 1144–1157.
- Berkowitz, D. and D. N. DeJong (2011). Growth in post-Soviet Russia: A tale of two transitions. *Journal of Economic Behavior & Organization* 79(1), 133–143.
- Bothner, M. S., Y.-K. Kim, and E. B. Smith (2012). How does status affect performance? status as an asset vs. status as a liability in the PGA and NASCAR. *Organization Science* 23(2), 416–433.
- Bottega, L. and J. D. Freitas (2009). Private, public and nonprofit regulation for environmental quality. *Journal of Economics and Management Strategy* 18(1), 105–123.
- Boulstridge, E. and M. Carrigan (2000). Do consumers really care about corporate responsibility? Highlighting the attitude–behavior gap. *Journal of Communication Management* 4, 355 – 368.
- Bourdieu, P. and L. J. Wacquant (1992). *An invitation to reflexive sociology*. University of Chicago Press.
- Bruton, G. D., D. Ahlstrom, and K. Obloj (2008). Entrepreneurship in emerging economies: Where are we today and where should the research go in the future.

- Entrepreneurship Theory and Practice* 32(1), 1–14.
- Burt, R. S. (1992). The social structure of competition. *Networks and Organizations: Structure, Form, and Action* 57, 91.
- Burt, R. S. (2000). The network structure of social capital. *Research in Organizational Behavior* 22, 345–423.
- Burt, R. S., R. M. Hogarth, and C. Michaud (2000). The social capital of french and american managers. *Organization Science* 11(2), 123–147.
- Carpenter, J. and C. Myers (2010). Why volunteer? Evidence on the role of altruism, image and incentives. *Journal of Public Economics* 94(11-12), 911–920.
- Carrigan, M. and A. Attalla (2001). The myth of the ethical consumer: do ethics matter in purchase behavior? *Journal of Consumer Marketing* 18, 560 – 577.
- Carrigan, M., I. Szmigin, and J. Wright (2004). Shopping for a better world? An interpretive study of the potential for ethical consumption within the older market. *Journal of Consumer Marketing* 21(6), 401 – 417.
- Casella, G. and R. Berger (2001). *Statistical Inference*. Duxbury Resource Center.
- Certo, S. T., R. H. Lester, C. M. Dalton, and D. R. Dalton (2006). Top management teams, strategy and financial performance: A meta-analytic examination. *Journal of Management Studies* 43(4), 813–839.
- Charlotte, H. and A. Ames (2000). *Ethical Consumerism. A Research Study Conducted for the Co-operative Bank by MORI*. London: MORI.
- Coleman, J. S. and J. S. Coleman (1994). *Foundations of social theory*. Harvard University Press.
- Creyer, E. (1997). The influence of firm behavior on purchase intention: do consumers really care about business ethics? *Journal of Consumer Marketing* 14(6), 421 – 432.
- Danz, D., D. Engelmann, and D. Kübler (2012). Do legal standards affect ethical concerns of consumers? An experiment on minimum wages. *Working Paper*.
- Darby, M. and E. Karni (1973). Free competition and the optimal amount of fraud. *Journal of Law and Economics* 16, 67–88.
- Davidsson, P. and S. R. Gordon (2012). Panel studies of new venture creation: a methods-focused review and suggestions for future research. *Small Business Economics* 39(4), 853–876.
- Demirgüç-Kunt, A., L. F. Klapper, and G. A. Panos (2011). Entrepreneurship in post-conflict transition1. *Economics of Transition* 19(1), 27–78.
- DePelsmacker, P., L. Driessen, and G. Rayp (2005). Do consumers care about ethics? Willingness to pay for fair-trade coffee. *The Journal of Consumer Affairs* 39(2), 363–385.

- Devinney, T., P. Auger, and G. Eckhardt (2010). *The myth of the ethical consumers*. Cambridge University Press.
- Devinney, T., P. Auger, G. Eckhardt, and T. Birtchnell (2006). The other CSR: consumer social responsibility. *Stanford Social Innovation Review* 4, 30 – 37.
- Dickinson, R. and S. C. Hollander (1991). Consumer votes. *Journal of Business Research* 23(1), 9–20.
- Djankov, S., E. Miguel, Y. Qian, G. Roland, and E. Zhuravskaya (2005). Who are Russia’s entrepreneurs? *Journal of the European Economic Association* 3(2-3), 587–597.
- Djankov, S., Y. Qian, G. Roland, and E. Zhuravskaya (2006). Entrepreneurship in China and Russia compared. *Journal of the European Economic Association* 4(2-3), 352–365.
- Dobrev, S. D. and W. P. Barnett (2005). Organizational roles and transition to entrepreneurship. *Academy of Management Journal* 48(3), 433–449.
- Dufwenberg, M., P. Heidhues, G. Kirchsteiger, F. Riedel, and J. Sobel (2011). Other-regarding preferences in general equilibrium. *Review of Economic Studies* 78(2), 613 – 639.
- Dulleck, U. and R. Kerschbamer (2006). On doctors, mechanics, and computer specialists: The economics of credence goods. *Journal of Economic Literature*, 5–42.
- Easterly, W. and R. Levine (1997). Africa’s growth tragedy: policies and ethnic divisions. *The Quarterly Journal of Economics* 112(4), 1203–1250.
- Eckhardt, J. T. and M. P. Ciuchta (2008). Selected variation: The population-level implications of multistage selection in entrepreneurship. *Strategic Entrepreneurship Journal* 2(3), 209–224.
- Eckhardt, J. T. and S. A. Shane (2003). Opportunities and entrepreneurship. *Journal of Management* 29(3), 333–349.
- Estrin, S., K. E. Meyer, and M. Bychkova (2006). Entrepreneurship in transition economies. In *The Oxford Handbook of Entrepreneurship*. Oxford University Press.
- Fearon, J. D. and D. D. Laitin (1996). Explaining interethnic cooperation. *American Political Science Review*, 715–735.
- Feddersen, T. and T. Gilligan (2001). Saints and markets: activists and the supply of credence goods. *Journal of Economics and Management Strategy* (1), 149–171.
- Fehr, E. and K. Schmidt (1999). A theory of fairness, competition and cooperation. *The Quarterly Journal of Economics* 114(3), 817–868.
- Friedman, M. (1996). A positive approach to organized consumer action: the "boycott" as alternative to the boycott. *Journal of Consumer Policy* 19, 439–451.

- Friedrichsen, J. and D. Engelmann (2013). Who cares for social image? Interactions between intrinsic motivation and social image concerns. *Working Paper*.
- Gabaix, X. and D. Laibson (2006). Shrouded attributes, consumer myopia, and information supression in competitive markets. *The Quarterly Journal of Economics* 121(2), 505–540.
- George, G., R. Kotha, P. Parikh, T. Alnuaimi, and A. S. Bahaj (2011). Optimism, vulnerability, and entrepreneurial intent: occupation change intentions in rural east africa. *Available at SSRN 1974060*.
- George, G., A. M. McGahan, and J. Prabhu (2012). Innovation for inclusive growth: towards a theoretical framework and a research agenda. *Journal of Management Studies* 49(4), 661–683.
- Giannetti, M. and A. Simonov (2009). Social interactions and entrepreneurial activity. *Journal of Economics & Management Strategy* 18(3), 665–709.
- Gibbons, R. (1992). *A primer in game theory*. Essex, England: Pearson Education Limited.
- Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology* 78(6).
- Granovetter, M. (1995). *Getting a job: A study of contacts and careers*. University of Chicago Press.
- Grosjean, P. (2011). The institutional legacy of the Ottoman Empire: Islamic rule and financial development in South Eastern Europe. *Journal of Comparative Economics* 39(1), 1–16.
- Grosjean, P. and C. Senik (2011). Democracy, market liberalization, and political preferences. *The Review of Economics and Statistics* 93(1), 365–381.
- Hainmueller, J., M. Hiscox, and S. Sequeira (2011). Consumer demand for the fair trade label: evidence from a field experiment. *Working Paper*.
- Hansen, M. T., M. L. Mors, and B. Løvås (2005). Knowledge sharing in organizations: Multiple networks, multiple phases. *Academy of Management Journal* 48(5), 776–793.
- Harrison, D. A. and K. J. Klein (2007). What’s the difference? diversity constructs as separation, variety, or disparity in organizations. *Academy of Management Review* 32(4), 1199–1228.
- Harrison, R., T. Newholm, and D. Shaw (2005). *The ethical consumers*. London: Sage.
- Hayek, F. (1945). The use of knowledge in society. *The American Economic Review* 35(4), 519 – 530.

- Hong, L. and S. E. Page (2001). Problem solving by heterogeneous agents. *Journal of Economic Theory* 97(1), 123–163.
- Human, S. E. and C. H. Matthews (2004). Future expectations for the new business. *Handbook of Entrepreneurial Dynamics: The Process of Business Creation*, 386–400.
- Iannaccone, L. R. (1992). Sacrifice and stigma: reducing free-riding in cults, communes, and other collectives. *Journal of Political economy*, 271–291.
- IFAT (2004). North America/Pacific Rim Conference Report. *IFAT, Bichester*.
- Joshi, A., H. Liao, and H. Roh (2011). Bridging domains in workplace demography research: A review and reconceptualization. *Journal of Management* 37(2), 521–552.
- Joshi, A. and H. Roh (2009). The role of context in work team diversity research: A meta-analytic review. *Academy of Management Journal* 52(3), 599–627.
- Kalish, Y. and G. Robins (2006). Psychological predispositions and network structure: The relationship between individual predispositions, structural holes and network closure. *Social Networks* 28(1), 56–84.
- Karlan, D. S. (2007). Social connections and group banking. *The Economic Journal* 117(517), F52–F84.
- Khayesi, J. N. and G. George (2011). When does the socio-cultural context matter? communal orientation and entrepreneurs’ resource accumulation efforts in africa. *Journal of Occupational and Organizational Psychology* 84(3), 471–492.
- Kim, P. H., H. E. Aldrich, and L. A. Keister (2006). Access (not) denied: The impact of financial, human, and cultural capital on entrepreneurial entry in the united states. *Small Business Economics* 27(1), 5–22.
- Kirzner, I. (1973). *Competition and Entrepreneurship*. Chicago: University of Chicago Press.
- Kotha, R. and G. George (2012). Friends, family, or fools: Entrepreneur experience and its implications for equity distribution and resource mobilization. *Journal of Business Venturing* 27(5), 525–543.
- Lazear, E. P. (1999). Globalisation and the market for team-mates. *The Economic Journal* 109(454), 15–40.
- Leonard, J. S., D. I. Levine, and A. Joshi (2004). Do birds of a feather shop together? the effects on performance of employees’ similarity with one another and with customers. *Journal of Organizational Behavior* 25(6), 731–754.
- Lindzey, G., D. Gilbert, and S. T. Fiske (2003). *The handbook of social psychology*. Oxford University Press.

- Lizzeri, A. (1999). Information revelation and certification intermediaries. *The RAND Journal of Economics* 30(2), 214–231.
- Luttmer, E. F. (2001). Group loyalty and the taste for redistribution. *Journal of Political Economy* 109(3), 500–528.
- Lyles, M. A., T. Saxton, and K. Watson (2004). Venture survival in a transitional economy. *Journal of Management* 30(3), 351–375.
- McMillan, J. and C. Woodruff (2002). The central role of entrepreneurs in transition economies. *Journal of Economic Perspectives* 16(3), 153–170.
- McMullen, J. S. (2011). Delineating the domain of development entrepreneurship: A market-based approach to facilitating inclusive economic growth. *Entrepreneurship Theory and Practice* 35(1), 185–193.
- Michalopoulos, S. and E. Papaioannou (2013). Pre-colonial ethnic institutions and contemporary african development. *Econometrica* 81(1), 113–152.
- Micheletti, M. (2003). *Political virtue and shopping: individuals, consumerism, and collective action*. Palgrave Macmillan.
- Murooka (2013). Deception under competitive intermediation. *Working Paper*.
- Nelson, P. (1970). Information and consumer behavior. *Journal of Political Economy* 78(2), 311–329.
- Newholm, T. and D. Shaw (2007). Studying the ethical consumer. *Journal of Consumer Behavior* 6(5), 253 – 270.
- Norenzayan, A. and A. F. Shariff (2008). The origin and evolution of religious prosociality. *Science* 322(5898), 58–62.
- Nunn, N. and L. Wantchekon (forthcoming). The slave trade and the origins of mistrust in africa. *American Economic Review*.
- Ottaviano, G. I. and G. Peri (2005). Cities and cultures. *Journal of Urban Economics* 58(2), 304–337.
- Pelled, L. H., K. M. Eisenhardt, and K. R. Xin (1999). Exploring the black box: An analysis of work group diversity, conflict and performance. *Administrative Science Quarterly* 44(1), 1–28.
- Perloff, J. and S. Salop (1985). Equilibrium with product differentiation. *Review of Economic Studies* 52(1), 107 – 120.
- Podolny, J. M. (1993). A status-based model of market competition. *American Journal of Sociology*, 829–872.
- Polanyi, M. (1967). The tacit dimension.

- Putnam, R., R. Leonardi, and R. Nanetti (1993). *Making democracy work* Princeton. Princeton University Press.
- Rabin, M. (1993). Incorporating fairness into game theory and economics. *The American Economic Review* 83(5), 1281–1302.
- Reynolds, P. D. (2007). *New firm creation in the United States*. Now.
- Reynolds, P. D. (2009). Screening item effects in estimating the prevalence of nascent entrepreneurs. *Small Business Economics* 33(2), 151–163.
- Richard, O. C. (2000). Racial diversity, business strategy, and firm performance: A resource-based view. *Academy of Management Journal* 43(2), 164–177.
- Richard, O. C., T. Barnett, S. Dwyer, and K. Chadwick (2004). Cultural diversity in management, firm performance, and the moderating role of entrepreneurial orientation dimensions. *Academy of Management Journal* 47(2), 255–266.
- Riordan, C. M. and L. M. Shore (1997). Demographic diversity and employee attitudes: An empirical examination of relational demography within work units. *Journal of Applied Psychology* 82(3), 342.
- Roberson, Q. M. and H. J. Park (2007). Examining the link between diversity and firm performance the effects of diversity reputation and leader racial diversity. *Group & Organization Management* 32(5), 548–568.
- Roberts, J. (1996). Will the real socially responsible consumer please step forward? *Business Horizons* 39(1), 79 – 83.
- Rotemberg, J. (2011). Fair pricing. *Journal of the European Economic Association*.
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied* 80(1), 1.
- Sacco, J. M. and N. Schmitt (2005). A dynamic multilevel model of demographic diversity and misfit effects. *Journal of Applied Psychology* 90(2), 203.
- Samuelsson, M. and P. Davidsson (2009). Does venture opportunity variation matter? investigating systematic process differences between innovative and imitative new ventures. *Small Business Economics* 33(2), 229–255.
- Schumpeter, J. A. (1934). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*, Volume 55. Transaction Publishers.
- Shane, S. and S. Venkataraman (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review* 25(1), 217–226.
- Shane, S. A. (2003). *A general theory of entrepreneurship: The individual-opportunity nexus*. Edward Elgar Publishing.
- Shaver, K. G., N. M. Carter, W. B. Gartner, and P. D. Reynolds (2001). Who is a nascent entrepreneur? decision rules for identifying and selecting entrepreneurs in



- the panel study of entrepreneurial dynamics (PSED). *Frontiers of Entrepreneurship Research* 122.
- Shaw, D. and I. Clark (1999). Belief formation in ethical consumer groups: an exploratory study. *Marketing Intelligence and Planning* 17(2), 109–120.
- Smallbone, D. and F. Welter (2006). Conceptualising entrepreneurship in a transition context. *International Journal of Entrepreneurship and Small Business* 3(2), 190–206.
- Sobel, J. (2005). Interdependent preferences and reciprocity. *Journal of Economic Literature* 43(2), 392–436.
- Spector, P. E. and M. T. Brannick (2011). Methodological urban legends: The misuse of statistical control variables. *Organizational Research Methods* 14(2), 287–305.
- Stigler, G. and G. Becker (1977). De gustibus non est disputandum. *The American Economic Review* 67, 76–90.
- Stolle, D., M. Hooghe, and M. Micheletti (2005). Politics in the supermarket: political consumerism as a form of political participation. *International Political Science Review* 26(3), 245 – 269.
- Tullock, G. (1985). Adam Smith and the prisoners’ dilemma. *Quarterly Journal of Economics* 100(5), 1073–81.
- Van Der Vegt, G. S., E. Van de Vliert, and X. Huang (2005). Location-level links between diversity and innovative climate depend on national power distance. *Academy of Management Journal* 48(6), 1171–1182.
- Van Knippenberg, D. and M. C. Schippers (2007). Work group diversity. *Annual Review of Psychology* 58, 515–541.
- Venkataraman, S. (1997). The distinctive domain of entrepreneurship research: An editor’s perspective. *Advances in Entrepreneurship, Firm Emergence, and Growth* 3, 119–138.
- Von Hippel, E. (1994). Sticky information and the locus of problem solving: implications for innovation. *Management Science* 40(4), 429–439.
- Watson, M. (2007). Trade justice and individual consumption choices: Adam Smith’s spectator theory and the moral constitution of the fair trade consumer. *European Journal of International Relations* 13(2), 263 –288.
- Williams, K. Y. and C. A. O’Reilly (1998). Demography and diversity in organizations: A review of 40 years of research. *Research in Organizational Behavior* 20, 77–140.
- Williams, R. (2012). Using the margins command to estimate and interpret adjusted predictions and marginal effects. *Stata Journal* 12(2).

Wilson, D. S. (2010). *Darwin's cathedral: Evolution, religion, and the nature of society*.  
University of Chicago Press.

# Erklärung über Zusammenarbeit mit Koautoren & Vorveröffentlichungen

## **Kapitel 1:**

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Jayaraman, R. and D. Simroth (2015). The impact of school lunches on primary school enrollment: evidence from India's Midday Meal Scheme. *The Scandinavian Journal of Economics* 1467-9442.

## **Kapitel 2:**

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## **Kapitel 3:**

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Simroth D. (2012). The role of information in the market for altruism. Master thesis. Humboldt Universität zu Berlin, Berlin.

# Ehrenwörtliche Erklärung

Hiermit erkläre ich, Dora Simroth, dass ich die vorliegende Arbeit allein und nur unter Verwendung der aufgeführten Quellen und Hilfsmittel angefertigt habe.

Die Prüfungsordnung ist mir bekannt. Ich habe in meinem Studienfach bisher keine Dissertation eingereicht bzw. diese nicht endgültig nicht bestanden.

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Dora Simroth

Berlin, Juli 2014